

The Army Ants of Mexico (Hymenoptera: Formicidae: Ecitoninae)

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ABSTRACT: This paper includes a list of the 45 known species and subspecies of Mexican army ants (Ecitoninae) along with their authors, description dates, and described castes; keys, along with over 250 original figures, specifically designed for identification of the Mexican forms; 21 distribution maps for 44 species and subspecies; alphabetical distribution lists arranged by genera-species-states, and by states-genera-species; a table of male flight periods; and cited references.

Discussion

Monographs of the New World army ants, Ecitoninae (Gotwald, 1979), were published by Borgmeier (1955) and Watkins (1976). Although Borgmeier (1955) included keys (in German) and is still the best source of descriptions and references, and Watkins (1976) included keys (in English) and distribution maps, those keys are very difficult to use, primarily because of the large number of species included and the polymorphism of the worker caste. Also, several new forms have been described since 1955.

This present paper was prepared to aid people in their study of the army ants of Mexico. It includes keys, and figures, specifically designed for the Mexican forms; therefore, fewer species are included than in the previous monographs and the keys are much easier to use. Also, the distribution maps are more detailed and contain many new locality records. A table of male flight periods of Mexican army ants is included for the first time (Pl. 21).

This paper is based, in part, on 16 years of intermittent study of the army ants of Mexico by the present author. Most of my expeditions to Mexico were made during the periods of December through January, and April through August, and included visits to most of the states in Mexico, except those in the extreme northwest (i.e., Chihuahua, Sonora, Baja California). During this period, most of the already widely-scattered small areas of Tropical Rain Forests have been cleared to make way for intensive cultivation and grazing. I was especially disappointed to discover in June 1980, that one of my frequent study sites, a small relic tropical forest along the Rio Corona northeast of Ciudad Victoria and only 180 miles south of Brownsville, Texas, was being cleared. This is the northern-most locality for several army ant species including *Eciton burchelli*. Of the few remaining patches of Tropical Rain Forests in Mexico, my favorite study area is the Archeo-

logical Zone near Palenque, Chiapas, where I have collected 17 species of army ants including all five New World genera.

Most of the army ant species in Mexico tend to be confined to the lower tropical zones, except for a few species such as *Labidus coecus*, *Neivamyrmex swainsoni*, *N. harrisi*, *N. agilis*, *N. nigrescens*, *N. macropterus*, *N. minor*, and *N. pilosus*, which are also found in the more temperate arid regions of northern Mexico.

The army ant species most frequently encountered in eastern and southern Mexico is *Labidus praedator*. This is in part due to the spectacular epigaeic swarm raids of these black workers which often cover several square meters of ground as they pass through camp sites. It is not uncommon to see Mexicans pouring soapy water on these swarms to divert them from their homes and businesses. On the other hand, the more broadly distributed hypogaeic workers of *L. coecus* are rarely seen, but males of both species of *Labidus* are common at lights throughout their ranges during their flight periods (Pl. 21).

The most frequently observed species of *Eciton* in Mexico is *E. burchelli*. This is due to a broad distribution and the epigaeic nesting, raiding, and migrating of the large workers. The males are only weakly attracted to ultraviolet light and I have never collected more than six during one night. Although also epigaeic, workers of *E. hamatum* are less frequently encountered within their more limited range (Map 4); however, males seem to be more strongly attracted to ultraviolet light and are sometimes collected in large numbers. These males are reddish brown in contrast to the more yellowish brown males from Panama. The other two species of *Eciton* (*E. vagans*, *E. mexicanum*) reported from Mexico are relatively rare. Six of the eleven collection records of *E. vagans* workers were made by me near Palenque, and *E. mexicanum* workers have been collected from only two widely separated areas (Map 4). Schneirla collected workers of *E. mexicanum* from three localities in southern Chiapas in 1945, and I collected workers from one colony near Tamazunchale, San Luis Potosi, in 1979. Also, the males which I reported (Watkins, 1976) as *E. uncinatum* were collected from the same locality near Tamazunchale, and since these males differ only slightly from those of "typical" *E. mexicanum*, they most likely belong to this species. There are no records of *E. vagans* males from Mexico.

Although 34 species of *Neivamyrmex* have been recorded from Mexico, workers of any one species are infrequently encountered, and I have collected large numbers of males (more than 50 per week) of only six species (*N. fumosus*, *N. swainsoni*, *N. pilosus*, *N. guerini*, *N. melsheimeri*, *N. longiscapus*). This is due, in part, to the mostly hypogaeic habits of the small workers, the limited flight periods of the males, and, perhaps, the small numbers of localities (as indicated by collection records) which they inhabit. According to available records, only three (*N. harrisi*, *N. swainsoni*, *N. pilosus*) of the

34 species have been collected from more than ten different localities in Mexico, and six species have each been collected from only one locality. Also, 17 of the above species are known only from males, ten only from workers, one from workers and queens, and six from all three castes. *Neivamyrmex inflatus*, known only from the male caste, is included in a key for the first time. I examined the original description (Borgmeier, 1958) and six males: one from Puerto Vallarta, Nayarit (about 75 miles from Tepic, the type locality); three from Campeche, Campeche; one from Chichen-Itza, Yucatan; and one from Middlesex, British Honduras. The males from Yucatan and British Honduras have larger frontal depressions (Pl. 10, Fig. 15), more rounded apices of the stipites (Pl. 15, Fig. 11), and slightly different volsellae and sagittae than those from Nayarit (Pl. 10, Fig. 17; Pl. 15, Fig. 13); however, males from Campeche are somewhat intermediate in these characteristics. *Neivamyrmex fuscipennis* is reported from Mexico for the first time. I observed and collected several males flying in bright sunshine from 7:00 to 8:00 a.m. on June 18–19, 1980, in the El Banito Trailer Park, nine miles south of Ciudad Valles, San Luis Potosi. Although an ultraviolet light trap was operated in the same area from dusk to dawn during both previous nights, no males of this species were trapped. These males have black wings and are easy to distinguish from males of the closely related *N. macropterus* which have larger, yellowish brown wings; however, males of these two “species” in the United States integrade in all their characteristics and are sometimes difficult to distinguish (Watkins, 1975).

Only one species of *Cheliomyrmex* (*C. morosus*) and two species of *No-mamyrmex* (*N. hartigi*, *N. esenbecki*) have been reported from Mexico. Workers of both genera are infrequently encountered; however, males are frequently collected at lights, and I have taken large numbers of males of *C. morosus* and *N. hartigi* in an ultraviolet light trap near Palenque, Chiapas, during May and June. Two subspecies of *N. esenbecki* (*N. e. mordax*, a western form; and *N. e. wilsoni*, an eastern form) occur in Mexico (Watkins, 1977). Although *N. e. wilsoni* has a much larger range (south Texas to Costa Rica), it has been less frequently collected than *N. e. mordax*.

List of Species, Subspecies, Authors, Dates and
Known Castes of Mexican Army Ants
(w = worker, q = queen, m = male)

Cheliomyrmex

morosus (F. Smith, 1859), wm

Eciton

burchelli parvispinum Forel, 1899, wqm

hamatum (Fabricius, 1781), wqm

mexicanum s. str. Roger, 1863, wqm

vagans angustatum Roger, 1863, wqm

Labidus

- coecus* (Latreille, 1802), wqm
praedator s. str. (Fr. Smith, 1858), wqm

Neivamyrmex

- agilis* Borgmeier, 1953, w
andrei (Emery, 1901), m
angulimandibulatus Watkins, 1974, m
cloosae (Forel, 1912), m
cornutus Watkins, 1975, w
diabolus (Forel, 1912), m
fallax Borgmeier, 1953, w
fumosus (Forel, 1913), m
fuscipennis (Wheeler, 1908), m
graciellae (Mann, 1926), w
guerini (Shuckard, 1840), m
halidayi (Shuckard, 1840), m
harrisi (Haldeman, 1852), wqm
impudens (Mann, 1922), w
inflatus Borgmeier, 1958, m
klugi distans Borgmeier, 1953, m
leonardi (Wheeler, 1915), w
longiscapus Borgmeier, 1953, m
macropterus Borgmeier, 1953, m
manni (Wheeler, 1914), w
melanocephalus (Emery, 1895), w
melsheimeri (Haldeman, 1852), m
minor (Cresson, 1872), m
nigrescens (Cresson, 1872), wqm
opacithorax (Emery, 1894), wqm
pauxillus (Wheeler, 1903), wq
pilosus mandibularis (M. R. Smith, 1942), m
pilosus mexicanus (Fr. Smith, 1859), wqm
rugulosus Borgmeier, 1953, w
spinolai (Westwood, 1842), wqm
spoliator (Forel, 1899), m
sumichrasti (Norton, 1868), w
swainsoni (Shuckard, 1840), m
texanus Watkins, 1972, wqm
tristis (Forel, 1901), m

Nomamyrmex

- esenbecki mordax* (Santschi, 1928), wm
esenbecki wilsoni (Santschi, 1920), wm
hartigi (Westwood, 1842), wm

Keys to Genera of Mexican Army Ants

WORKERS

1. Postpetiole absent (Pl. 7, Fig. 8) *Cheliomyrmex*
- Postpetiole present (Pl. 4, Fig. 1; Pl. 5, Figs. 1, 5; Pl. 6, Fig. 1) ... 2
2. Concave surface of tarsal claw without tooth (Pl. 19, Fig. 20)
..... *Neivamyrmex*
- Concave surface of tarsal claw with small tooth (Pl. 19, Figs. 21–24)
..... 3
3. Antennal scape thick (apical width greater than one-third its length;
Pl. 3, Figs. 7–10) *Nomamyrmex*
- Antennal scape slender (apical width less than one-third its length;
Pl. 1, Figs. 1–4; Pl. 3, Figs. 4–6) 4
4. Posterodorsal corners of propodeum with teeth or lamellae (Pl. 4,
Figs. 1–4) *Eciton*
- Posterodorsal corners of propodeum rounded and without teeth or
lamellae (Pl. 5, Figs. 5, 6) *Labidus*

MALES (genitalia, Pl. 20)

1. Gastric tergites with conspicuous tufts of long, dense setae (Pl. 9,
Figs. 16–18) *Nomamyrmex*
- Gastric tergites without distinct tufts of setae 2
2. Subgenital plate with three or four apical teeth—two outer apical
and one or two small inner subapical (Pl. 12, Figs. 1, 9–16; Pl. 13,
Figs. 4–18)—exception: *N. klugi* has only two subgenital plate teeth,
but its two “teeth” on the lower border of the clypeus (Pl. 9, Fig. 13)
and small size (length about 10 mm) will separate it from all species
in couplet 2.b 3
- Subgenital plate with only two apical teeth (Pl. 12, Figs. 5–8; Pl. 13,
Figs. 1, 2) 4
3. Length 6–16 mm; antennal flagellum distinctly longer than head
width *Neivamyrmex*
- Length 19–22 mm; antennal flagellum about as long as width of head
..... *Cheliomyrmex*
4. Mandibles sickle-shaped (Pl. 9, Figs. 8, 9); subgenital plate spoon-
shaped (Pl. 13, Figs. 1, 2) *Labidus*
- Mandibles not sickle-shaped (Pl. 9, Figs. 2–7); subgenital plate elon-
gate (Pl. 12, Figs. 5–8) *Eciton*

Table 1. Key characteristics of genera of male army ants.

	<i>Noma.</i>	<i>Neiv.</i>	<i>Chelio.</i>	<i>Labidus</i>	<i>Eciton</i>
Tufts of long setae on gastric tergites	+	—	—	—	—
No. apical teeth subgenital plate	2	2 ¹ , 3, 4	4	2	2
Sickle-shaped mandibles	+	+—	+	+	—
Total length (mm)	16–21	6–16	19–21	17–20	15–18
Setae present on apex of sagitta	+	—	+	+	—

¹ *Neivamyrmex klugi* is the only Mexican species of *Neivamyrmex* with only two teeth on the subgenital plate.

List (Alphabetical) of Mexican Army Ants
State: Genus: Species

AGUASCALIENTES

Neivamyrmex
harrisi

BAJA CALIFORNIA NORTE

Neivamyrmex
leonardi
minor
nigrescens
swainsoni

BAJA CALIFORNIA SUR

Neivamyrmex
leonardi
minor
opacithorax

CAMPECHE

Cheliomyrmex
morosus

Eciton

hamatum

Neivamyrmex

diabolus
fumosus
guerini
inflatus
melsheimeri
pilosus mexicanus
swainsoni

Nomamyrmex
hartigi

CHIAPAS

Cheliomyrmex
morosus

Eciton

burchelli parvispinum
hamatum
mexicanum s. str.
vagens angustatum

Labidus

coecus
praedator s. str.

Neivamyrmex

fumosus
guerini
halidayi
klugi distans
longiscapus
melsheimeri
pilosus mexicanus
spoliator
sumichrasti
swainsoni
tristis

Nomamyrmex

esenbecki wilsoni
hartigi

CHIHUAHUA

Labidus
coecus
Neivamyrmex
agilis
harrisi
macropterus
swainsoni

COAHUILA

Labidus
coecus
Neivamyrmex
harrisi
minor
pilosus mexicanus
swainsoni

COLIMA

Eciton
burchelli parvispinum
Neivamyrmex
andrei
halidayi
harrisi
pilosus mandibularis
Nomamyrmex
esenbecki mordax

DISTRITO FEDERAL

Labidus
coecus

DURANGO

Neivamyrmex
harrisi
macropterus
swainsoni
Nomamyrmex
esenbecki mordax

GUERRERO

Eciton
burchelli parvispinum
Neivamyrmex
cloosae

Nomamyrmex
esenbecki mordax

HIDALGO

Cheliomyrmex
morosus
Labidus
coecus
Neivamyrmex
manni
melanocephalus
pauillus
texanus

JALISCO

Eciton
burchelli parvispinum
Labidus
coecus
Neivamyrmex
agilis
graciellae
harrisi
melanocephalus
opacithorax
pilosus mandibularis
rugulosus
swainsoni
texanus

Nomamyrmex
esenbecki mordax

MICHOACAN

Labidus
coecus
Neivamyrmex
fallax
melanocephalus
Nomamyrmex
esenbecki mordax

MORELOS

Neivamyrmex
cornutus
Nomamyrmex
esenbecki mordax

NAYARIT

*Labidus**coecus**Neivamyrmex**andrei**harrisi**inflatus**melanocephalus**nigrescens**pilosus mandibularis**rugulosus**Nomamyrmex**esenbecki mordax*

NUEVO LEON

*Labidus**coecus**praedator s. str.**Neivamyrmex**harrisi*

OAXACA

*Eciton**burchelli parvispinum**hamatum**vagans angustatum**Labidus**coecus**praedator s. str.**Neivamyrmex**cornutus**fallax**graciellae**halidayi**nigrescens**swainsoni**Nomamyrmex**esenbecki mordax*

PUEBLA

*Eciton**burchelli parvispinum**Labidus**praedator s. str.**Neivamyrmex**macropterus**melsheimeri**pilosus mexicanus**swainsoni*

QUINTANA ROO

*Eciton**burchelli parvispinum**Neivamyrmex**fumosus**guerini**melsheimeri*

SAN LUIS POTOSI

*Cheliomyrmex**morosus**Eciton**burchelli parvispinum**mexicanum s. str.**Labidus**coecus**praedator s. str.**Neivamyrmex**fuscipennis**impudens**longiscapus**melsheimeri**pilosus mexicanus**swainsoni**texanus**tristis*

SINALOA

*Eciton**burchelli parvispinum**Labidus**coecus**Neivamyrmex**andrei**harrisi**pilosus mandibularis**swainsoni**Nomamyrmex**esenbecki mordax*

SONORA

Neivamyrmex

harrisi
nigrescens
rugulosus
swainsoni

Nomamyrmex

esenbecki mordax

TABASCO

Neivamyrmex

fumosus
halidayi
longiscapus
pilosus mexicanus

TAMAULIPAS

Eciton

burchelli parvispinum

Labidus

coecus

Neivamyrmex

harrisi
leonardi
melsheimeri
pilosus mexicanus
swainsoni

Nomamyrmex

esenbecki wilsoni

VERACRUZ

Cheliomyrmex

morosus

Eciton

burchelli parvispinum
hamatum

Labidus

coecus
praedator s. str.

Neivamyrmex

andrei
angulimandibulatus
diabolus
guerini
halidayi
longiscapus
melsheimeri
pilosus mexicanus
spinolai
spoliator
sumichrasti
swainsoni
tristis

Nomamyrmex

esenbecki wilsoni
hartigi

YUCATAN

Eciton

burchelli parvispinum
hamatum
vagans angustatum

Labidus

praedator s. str.

Neivamyrmex

fumosus
guerini
impudens
inflatus
melsheimeri
swainsoni

Nomamyrmex

esenbecki wilsoni
hartigi

ZACATECAS

Neivamyrmex

harrisi

List (Alphabetical) of Mexican Army Ants
Genus: Species: State

*CHELIOMYRMEX**C. morosus*

Campeche

Chiapas

Hidalgo

San Luis Potosi

Veracruz

Distrito Federal

Hidalgo

Jalisco

Michoacan

Nayarit

Nuevo Leon

Oaxaca

San Luis Potosi

*ECITON**E. burchelli parvispinum*

Chiapas

Colima

Guerrero

Jalisco

Oaxaca

Puebla

Quintana Roo

San Luis Potosi

Sinaloa

Tamaulipas

Veracruz

Yucatan

Sinaloa

Tamaulipas

Veracruz

L. praedator s. str.

Chiapas

Nuevo Leon

Oaxaca

Puebla

San Luis Potosi

Veracruz

Yucatan

E. hamatum

Campeche

Chiapas

Oaxaca

Veracruz

Yucatan

E. mexicanum s. str.

Chiapas

San Luis Potosi

E. vagans angustatum

Chiapas

Oaxaca

Yucatan

*NEIVAMYRMEX**N. agilis*

Chihuahua

Jalisco

N. andrei

Colima

Nayarit

Sinaloa

Veracruz

N. angulimandibulatus

Veracruz

N. cloosae

Guerrero

N. cornutus

Morelos

Oaxaca

N. diabolus

Campeche

Veracruz

*LABIDUS**L. coecus*

Chiapas

Chihuahua

Coahuila

N. fallax

Michoacan
Oaxaca

N. fumosus

Campeche
Chiapas
Quintana Roo
Tabasco
Yucatan

N. fuscipennis

San Luis Potosi

N. graciellae

Jalisco
Oaxaca

N. guerini

Campeche
Chiapas
Quintana Roo
Veracruz
Yucatan

N. halidayi

Chiapas
Colima
Oaxaca
Tabasco
Veracruz

N. harrisi

Aguascalientes
Chihuahua
Coahuila
Durango
Jalisco
Nayarit
Nuevo Leon
Sinaloa
Sonora
Tamaulipas
Zacatecas

N. impudens

San Luis Potosi
Yucatan

N. inflatus

Campeche

Nayarit

Yucatan

N. klugi distans

Chiapas

N. leonardi

Baja California Norte
Baja California Sur
Tamaulipas

N. longiscapus

Chiapas
San Luis Potosi
Tabasco
Veracruz
Yucatan

N. macropterus

Chihuahua
Durango
Puebla

N. manni

Hidalgo

N. melanocephalus

Hidalgo
Jalisco
Michoacan
Nayarit

N. melsheimeri

Campeche
Chiapas
Puebla
Quintana Roo
San Luis Potosi
Tamaulipas
Veracruz
Yucatan

N. minor

Baja California Norte
Baja California Sur
Coahuila

N. nigrescens

Baja California Norte
Nayarit
Isla Maria Cleofas
Isla Maria Magdalena

- Oaxaca
 Sonora
N. opacithorax
 Baja California Sur
 Jalisco
N. pauxillus
 Hidalgo
N. pilosus mandibularis
 Colima
 Jalisco
 Nayarit
 Sinaloa
N. pilosus mexicanus
 Campeche
 Chiapas
 Coahuila
 Puebla
 San Luis Potosi
 Tabasco
 Tamaulipas
 Veracruz
N. rugulosus
 Jalisco
 Nayarit
 Sonora
N. spinolai
 Veracruz
N. spoliator
 Chiapas
 Veracruz
N. sumichrasti
 Chiapas
 Veracruz
N. swainsoni
 Baja California
 Campeche
 Chiapas
 Chihuahua
 Coahuila
 Durango
 Jalisco
 Oaxaca
 Puebla
 San Luis Potosi
 Sinaloa
 Sonora
 Tamaulipas
 Veracruz
 Yucatan
N. texanus
 Hidalgo
 Jalisco
 San Luis Potosi
N. tristis
 Chiapas
 San Luis Potosi
 Veracruz
 NOMAMYRMEX
N. esenbecki mordax
 Colima
 Durango
 Guerrero
 Jalisco
 Michoacan
 Morelos
 Nayarit
 Oaxaca
 Sinaloa
 Sonora
N. esenbecki wilsoni
 Chiapas
 Tamaulipas
 Veracruz
 Yucatan
N. hartigi
 Campeche
 Chiapas
 Veracruz
 Yucatan

Keys to Species of Mexican Army Ants
(Number in parentheses after each species refers to a distribution map)

CHELIOMYRMEX

Cheliomyrmex morosus (3) is the only species of this genus known from Mexico. Worker (Pl. 3, Fig. 3; Pl. 7, Fig. 8; Pl. 8, Fig. 18). Male (Pl. 9, Fig. 1; Pl. 12, Fig. 1; Pl. 14, Fig. 1; Pl. 16, Fig. 9; Pl. 18, Fig. 10; Pl. 19, Fig. 24).

ECITON

SOLDIERS

- 1. Head yellowish; propodeal teeth triangular (Pl. 4, Figs. 1, 4, lateral views) and separated (Pl. 4, Figs. 5, 8, dorsal view) 2
- Head reddish-brown; propodeal teeth spinous (Pl. 4, Fig. 2, lateral view) or fused (Pl. 4, Fig. 6, dorsal view) 3
- 2. Head glossy; petiole elongate rectangular (Pl. 4, Fig. 8, dorsal view) *hamatum* (4)
- Head dull; petiole subquadrate trapezoidal (Pl. 4, Fig. 5, dorsal view) *burchelli* (6)
- 3. Propodeal teeth partially or completely fused (Pl. 4, Fig. 6, dorsal view) *mexicanum* (4)
- Propodeal teeth separated and distinctly spinous (Pl. 4, Figs. 2, 7) *vagens* (5)

MALES

- 1. Mandible slender and without an inner subapical corner or projection (Pl. 9, Fig. 2) *burchelli* (6)
- Mandible broad and with an inner subapical corner or projection (Pl. 9, Figs. 3–7) 2
- 2. Mandible distinctly triangular and with a slender, strongly curved apical tooth (Pl. 9, Figs. 3, 4) *mexicanum* (4)
- Mandible not distinctly triangular, but broad with an inner subapical tooth or corner and with a smaller gradually tapered apical tooth (Pl. 9, Figs. 5–7) 3
- 3. Gaster with long scattered setae; claw with small tooth on inner surface; length of mandible about equal height of head (Pl. 9, Fig. 5) *hamatum* (4)
- Gaster without long setae; claw without tooth on inner surface; length of mandible about one and one-half times height of head (Pl. 9, Fig. 7) *vagens* (5)

LABIDUS

WORKERS

- 1. Petiole with anteroventral tooth (Pl. 5, Fig. 5); color reddish brown *coecus* (1)

- Petiole without anteroventral tooth (Pl. 5, Fig. 6); color black to blackish brown *praedator* (2)

MALES

1. Lower border of clypeus concave in the middle (Pl. 9, Fig. 8); posterior corners of petiole strongly projecting; volsella somewhat hook-shaped with a posterior projection (Pl. 18, Fig. 15) *coecus* (1)
- Lower border of clypeus almost straight in middle (Pl. 9, Fig. 9); posterior corners of petiole not strongly projecting; volsella somewhat pick-shaped with sharp dorsal and ventral projection (Pl. 18, Fig. 16) *praedator* (2)

NEIVAMYRMEX

WORKERS

1. Head smooth and glossy with scattered punctations 2
- Head finely to coarsely granulated 13
2. Eye with distinct convex cornea, and apex of antennal scape clearly reaches or exceeds eye level (Pl. 1, Figs. 5, 7-10; Pl. 2, Figs. 1, 2) 3
- Eye without a distinct convex cornea—reduced to yellow speck or absent, and apex of antennal scape does not exceed eye level or middle of head if eye is absent (Pl. 1, Fig. 6; Pl. 2, Figs. 3, 4; Pl. 3, Figs. 1, 2) 9
3. Petiole subquadrate (Pl. 8, Fig. 1, dorsal view) *harrisi* (7)
- Petiole elongate or somewhat oval (Pl. 8, Figs. 2-7, dorsal view) 4
4. From a dorsal view, the concave portion of the posterior head margin appears slightly narrower than the greatest width of the alitrunk (Pl. 8, Figs. 2-5); anteroventral tooth of petiole sharp pointed or distinctly angular—although very small on *N. melanocephalus* (Pl. 6, Figs. 2-5) 5
- From a dorsal view, the concave portion of posterior head margin appears as wide or wider than the greatest width of alitrunk (Pl. 8, Figs. 6-7); anteroventral tooth of petiole bluntly rounded or absent (Pl. 6, Figs. 6, 7) 8
5. Head blackish brown to black 6
- Head yellowish brown to reddish brown 7
6. Head and alitrunk about same color; anteroventral tooth of petiole prominent with an acute spine directed posteroventrad (Pl. 6, Fig. 2) *pilosus* (8)
- Head and gaster blackish brown, alitrunk reddish brown; anteroventral tooth of petiole small and directed ventrad (Pl. 6, Fig. 3) *melanocephalus* (9)
7. Anteroventral tooth of petiole large and triangular (Pl. 6, Fig. 4);

- lamella in front of antennal fossa narrow or absent (Pl. 1, Fig. 9) *graciellae* (9)
- Anteroventral tooth of petiole spinous (Pl. 6, Fig. 5); lamella in front of antennal fossa broad (Pl. 1, Fig. 10) *impudens* (9)
8. Head and gaster of smaller workers blackish brown or reddish brown with a blackish overcast, alitrunk reddish brown without a blackish overcast; dorsum of promesonotum slightly convex, and dorsum of propodeum as short or shorter than node of petiole (lateral view, Pl. 6, Fig. 6) *manni* (10)
- Head and alitrunk same color (reddish brown), gaster slightly lighter; posterior one-half of dorsum of promesonotum flattened, and dorsum of propodeum longer than node of petiole (lateral view, Pl. 6, Fig. 7) *opacithorax* (10)
9. Suture between promesonotum and mesopleuron, in profile, complete and distinct (Pl. 6, Fig. 8); apex of antennal scape almost reaches eye level (Pl. 2, Fig. 3); petiole elongate (about one and one-half times longer than wide, dorsal view, Pl. 8, Fig. 8) ... *agilis* (10)
- Suture between promesonotum and mesopleuron, in profile, incomplete (Pl. 6, Figs. 9, 10; Pl. 7, Figs. 1, 2); apex of antennal scape distinctly does not reach eye level or middle of head if eyes are absent (Pl. 1, Fig. 6; Pl. 2, Fig. 4; Pl. 3, Figs. 1, 2); petiole *usually* subquadrate (almost as wide as long or wider, dorsal view, Pl. 8, Figs. 9–12) 10
10. Lamella in front of antennal fossa broad (Pl. 3, Fig. 1) . *leonardi* (11)
- Lamella in front of antennal fossa narrow or absent (Pl. 1, Fig. 6; Pl. 2, Fig. 4; Pl. 3, Fig. 2) 11
11. Dorsal surface of propodeum distinctly longer than declining surface in profile (Pl. 6, Fig. 10); largest workers less than 3.5 mm long *pauxillus* (11)
- Dorsal surface of propodeum not distinctly longer than declining surface in profile (Pl. 7, Figs. 1, 2); largest workers more than 4 mm long 12
12. Petiole slightly longer than wide (dorsal view, Pl. 8, Fig. 11); anteroventral tooth of petiole acute (Pl. 7, Fig. 1); largest workers less than 4.5 mm long *fallax* (11)
- Petiole slightly wider than long (dorsal view, Pl. 8, Fig. 12); anteroventral tooth of petiole absent or broadly triangular (Pl. 7, Fig. 2); largest worker more than 5.0 mm long *spinolai*
13. Inner basal surface of mandible straight and forms a sharp angle or tooth at its juncture with masticatory surface (Pl. 2, Fig. 5); posterolateral corners of head without distinct teeth or projections (frontal view, Pl. 2, Fig. 5) *rugulosus* (12)

- Inner basal surface of mandible gradually curves into masticatory surface without a distinct corner, and posterolateral corners of head projecting or with distinct teeth (Pl. 2, Figs. 6–9) 14
- 14. Head and alitrunk with numerous large round pit-like depressions; color black to dark reddish brown *sumichrasti* (12)
- Head and alitrunk, although thickly granulated and sometimes rugated, without distinct round pit-like depressions; color usually reddish brown 15
- 15. Posterolateral corners of head strongly projecting (Pl. 2, Fig. 7) *cornutus* (13)
- Posterolateral corners of head only moderately projecting or with small, slightly out-turned teeth (Pl. 2, Figs. 8, 9) 16
- 16. Juncture of dorsal and declining surfaces of propodeum form a slightly angular corner in profile (Pl. 7, Fig. 6) *texasus* (13)
- Juncture of dorsal and declining surfaces of propodeum rounded in profile (Pl. 7, Fig. 7) *nigrescens* (13)

MALES

1. Lower border of clypeus with two distinct teeth (Pl. 9, Figs. 13, 15) 2
- Lower border of clypeus without two distinct teeth (Pl. 10, 11) . 3
2. Apex of subgenital plate with two teeth (Pl. 13, Fig. 3); stipes with a broad subapical dorsal projection and an apical hook-shaped tooth (Pl. 14, Fig. 11) *klugi* (17)
- Apex of subgenital plate with three teeth—two large outer apical teeth and one small median subapical tooth (Pl. 12, Fig. 9); stipes with a dorsal subapical notch and a blunt apex (Pl. 14, Fig. 12) *guerini* (18)
3. Apex of subgenital plate with four teeth—two large outer apical teeth and two small inner subapical teeth (Pl. 13, Figs. 4, 5) ... 4
- Apex of subgenital plate with three teeth—two large outer apical teeth and one small median subapical tooth (Pl. 12, Figs. 10–16; Pl. 13, Figs. 6–18) 5
4. Distance from lateral ocellus to compound eye less than one-half diameter of median ocellus (Pl. 10, Fig. 1); median ocellus large (diameter about 0.44 mm); wings grayish yellow *halidayi* (7)
- Distance from lateral ocellus to compound eye about equal diameter of median ocellus (Pl. 10, Fig. 2); median ocellus medium sized (diameter about 0.28 mm); wings blackish *spinolai*
5. Mandible distinctly sickle-shaped, i.e. curved inward and gradually tapered to a sharp apex (Pl. 10, Figs. 3–14) 6
- Mandible not distinctly sickle-shaped, but unevenly tapered with a slight to strong convexity along the middle of the inner surface

- (Pl. 10, Figs. 15, 17; Pl. 11, Figs. 2, 4, 5) *or* spatulate (Pl. 11, Figs. 7–12) 15
6. Apex of sagitta elongated into a broad dorsal beak-like projection which extends well beyond the ventral apical projections (lateral view, Pl. 18, Figs. 5–9) 7
- Apex of sagitta not forming a dorsal beak-like projection and not extending far beyond the ventral projections (lateral view, Pl. 17, Figs. 5–8) 11
7. Volsella forked (Pl. 19, Figs. 1–3); length greater than 8 mm ... 8
- Volsella not forked (Pl. 18, Figs. 24, 25); length about 8 mm or less 10
8. Distance from lateral ocellus to compound eye greater than diameter of median ocellus (Pl. 10, Fig. 4); apex of stipes distinctly truncated (Pl. 15, Fig. 1) *spoliator* (17)
- Distance from lateral ocellus to compound eye less than diameter of median ocellus (Pl. 10, Figs. 5, 6); apex of stipes not distinctly truncated (Pl. 15, Figs. 2, 3) 9
9. Head and wings black; distance from lateral ocellus to compound eye usually about one-half diameter of median ocellus (Pl. 10, Fig. 5) *fuscipennis* (7)
- Head and wings reddish brown to yellowish brown; distance from lateral ocellus to compound eye usually about one-fourth (or less) the diameter of median ocellus (Pl. 10, Fig. 6) ... *macropterus* (15)
10. Stipes, in profile, narrowed and rounded apically (Pl. 15, Fig. 4); ventral projections of sagitta well developed (Pl. 18, Fig. 8) *tristis* (16)
- Stipes, in profile, truncated and not narrowed apically (Pl. 15, Fig. 5); ventral projections of sagitta absent (Pl. 18, Fig. 9) *melsheimeri* (15)
11. Distance from lateral ocellus to compound eye distinctly greater than diameter of median ocellus (Pl. 10, Fig. 10); upper border of head strongly elevated above compound eye and forms distinctly rounded corners between compound eye and lateral ocellus (frontal view, Pl. 10, Fig. 10); stipes (Pl. 15, Fig. 6) *cloosae* (16)
- Distance from lateral ocellus to compound eye less than diameter of median ocellus, and upper border of head not distinctly elevated above compound eye and does not form a rounded corner between compound eye and lateral ocellus (frontal view, Pl. 10, Figs. 11–14) 12
12. Front coxa about as wide as long (Pl. 9, Fig. 20); apex of stipes divided into a long rectangular dorsal process and a large triangular ventral process (Pl. 15, Fig. 7) *andrei* (16)

- Front coxa longer than wide (Pl. 9, Fig. 19); apex of stipes not divided into distinct dorsal and ventral projections (Pl. 15, Figs. 8–10) 13
- 13. Length greater than 10 mm; length of mandible greater than length of compound eye (Pl. 10, Fig. 3); dorsal border of stipes not forming a broad triangle and without a tall dorsal subapical projection (Pl. 15, Fig. 8) *swainsoni* (14)
- Length less than 10 mm; length of mandible about equals height of compound eye (Pl. 10, Figs. 12–14); dorsal border of stipes broadly triangular *or* with a tall dorsal subapical projection (Pl. 15, Figs. 9, 10) 14
- 14. Dorsal border of stipes with a tall apical or subapical projection (Pl. 15, Fig. 9); lateral ocellus almost touching compound eye (Pl. 10, Fig. 12) *fumosus* (20)
- Dorsal border of stipes broadly triangular (Pl. 15, Fig. 10); lateral ocellus distinctly separated from compound eye (Pl. 10, Fig. 14) *minor* (15)
- 15. Mandible with inner median border slightly to strongly convex and with apex bent inward (Pl. 10, Figs. 15, 17; Pl. 11, Figs. 2, 4, 5) 16
- Mandible bent inward basally and spatulate distally, but without an inward bent apex (Pl. 11, Figs. 7–12) 18
- 16. Occiput not concave in profile (Pl. 10, Figs. 16, 18) *inflatus* (17)
- Occiput distinctly concave in profile with upturned posterior margin (Pl. 11, Figs. 1, 3, 6) 17
- 17. Length of antennal scape 1 mm or slightly longer (Pl. 11, Figs. 1, 2); mesopleuron with long setae; stipes with broad dorsal notch (Pl. 15, Fig. 12) *longiscapus* (19)
- Length of antennal scape slightly shorter than 1 mm (Pl. 11, Figs. 3–6); mesopleuron usually with short pubescent setae; stipes without a distinct dorsal notch (Pl. 15, Figs. 14, 15) *pilosus* (8)
- 18. Distance from lateral ocellus to compound eye about equal or less than diameter of median ocellus (Pl. 11, Figs. 7–9); alitrunk yellowish brown to reddish brown 19
- Distance from lateral ocellus to compound eye at least two times diameter of median ocellus (Pl. 11, Figs. 10–12); alitrunk black . 21
- 19. Mandible moderately (about 135°) bent inward almost at its base and with almost straight inner surface beyond bend (Pl. 11, Fig. 7); posterodorsal surface of stipes without a prominent dorsal projection (Pl. 16, Fig. 1) *harrisi* (7)
- Mandible strongly (about 90°–100°) bent inward about one-third its length from base and with a convex inner surface beyond bend

- (Pl. 11, Figs. 8, 9); posterodorsal surface of stipes with an acute angular or rounded dorsal projection (Pl. 16, Figs. 3, 4) 20
20. Setae on antennal scape and legs short and appressed; posterodorsal corner of stipes with acute angular dorsal projection (Pl. 16, Fig. 4) *diabolus* (19)
- Setae on antennal scape and legs long and erect; posterodorsal surface of stipes with rounded dorsal projection (Pl. 16, Fig. 3) *angulimandibulatus* (20)
21. Head, alitrunk and gaster usually black to blackish brown; prominent transverse swelling present above antennal fossa (Pl. 11, Fig. 10); posterodorsal border of stipes with indistinct, low triangular projection (Pl. 16, Fig. 5) *nigrescens* (13)
- Head and alitrunk black, gaster usually reddish brown; transverse swelling above antennal fossa weak to absent (Pl. 11, Figs. 11, 12); posterodorsal corner of stipes somewhat rounded (Pl. 16, Fig. 6) or with a prominent tall dorsal projection (Pl. 16, Fig. 2) 22
22. Apex of stipes with a tall dorsal projection (Pl. 16, Fig. 2); length 11–13 mm *texanus* (13)
- Apex of stipes without a dorsal projection (Pl. 16, Fig. 6); length 10–11 mm *opacithorax* (10)

NOMAMYRMEX

WORKERS

1. Postoccipital sulcus present (Pl. 5, Figs. 7, 8); dorsum of petiole with longitudinal rugae *esenbecki* (21)
- Postoccipital sulcus absent (Pl. 5, Fig. 9); dorsum of petiole without longitudinal rugae *hartigi* (21)

MALES

1. Longitudinal rugae usually present on first gastric tergite; setae distinctly separated along midline of fifth gastric tergite (Pl. 9, Figs. 17, 18); width of blade of stipes about one-half its length (Pl. 14, Figs. 2, 3); apex of volsella blunt or tapered (Pl. 18, Figs. 17, 18) *esenbecki* (21)
- Longitudinal rugae absent on first gastric tergite; setae not distinctly separated along midline of fifth gastric tergite (Pl. 9, Fig. 16); width of blade of stipes at least two-thirds its length (Pl. 14, Fig. 4); apex of volsella with an angular posteroventral projection (Pl. 18, Fig. 19) *hartigi* (21)

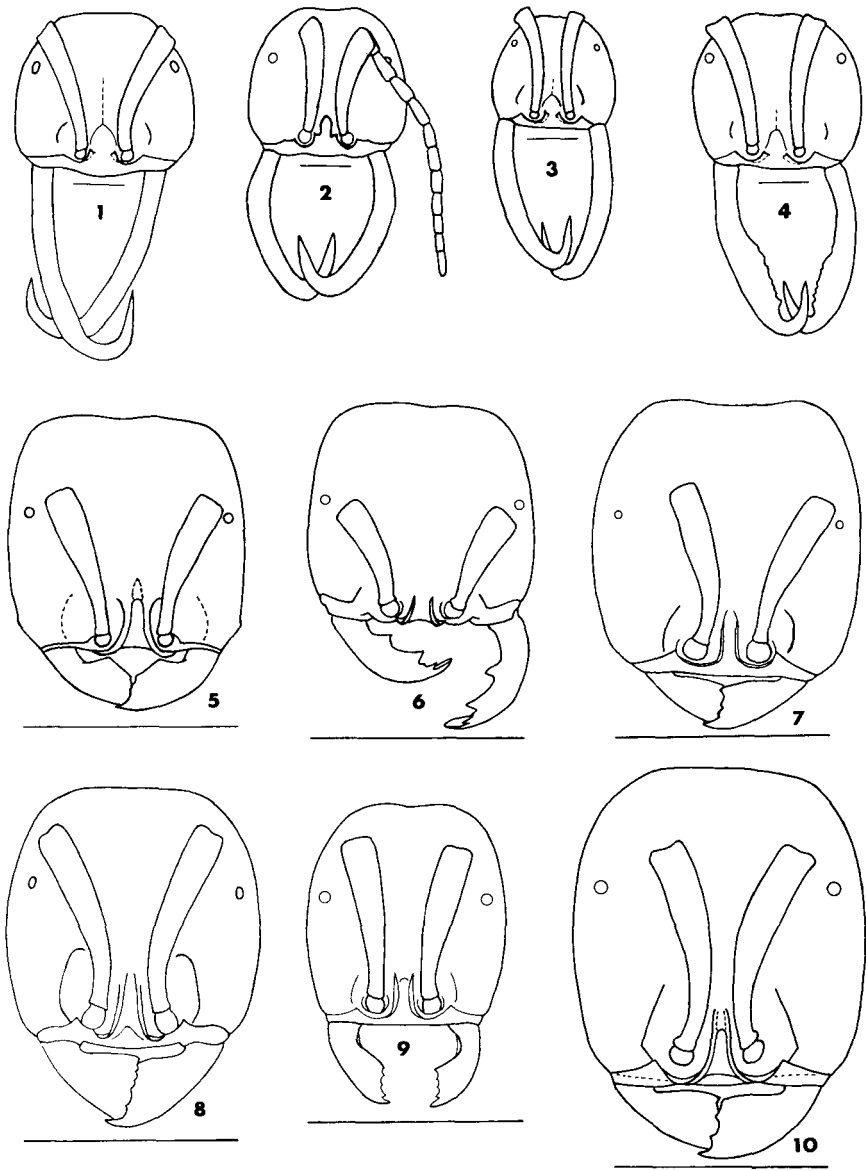


Plate 1. Figs. 1-10. Heads of major workers of (1) *Eciton burchelli parvispinum*, (2) *E. hamatum*, (3) *E. mexicanum*, (4) *E. vagans angustatum*, (5) *Neivamyrmex harrisi*, (6) *N. spinolai*, (7) *N. pilosus mexicanus*, (8) *N. melanocephalus*, (9) *N. graciellae*, (10) *N. impudens*. Lines are 1.0 mm.

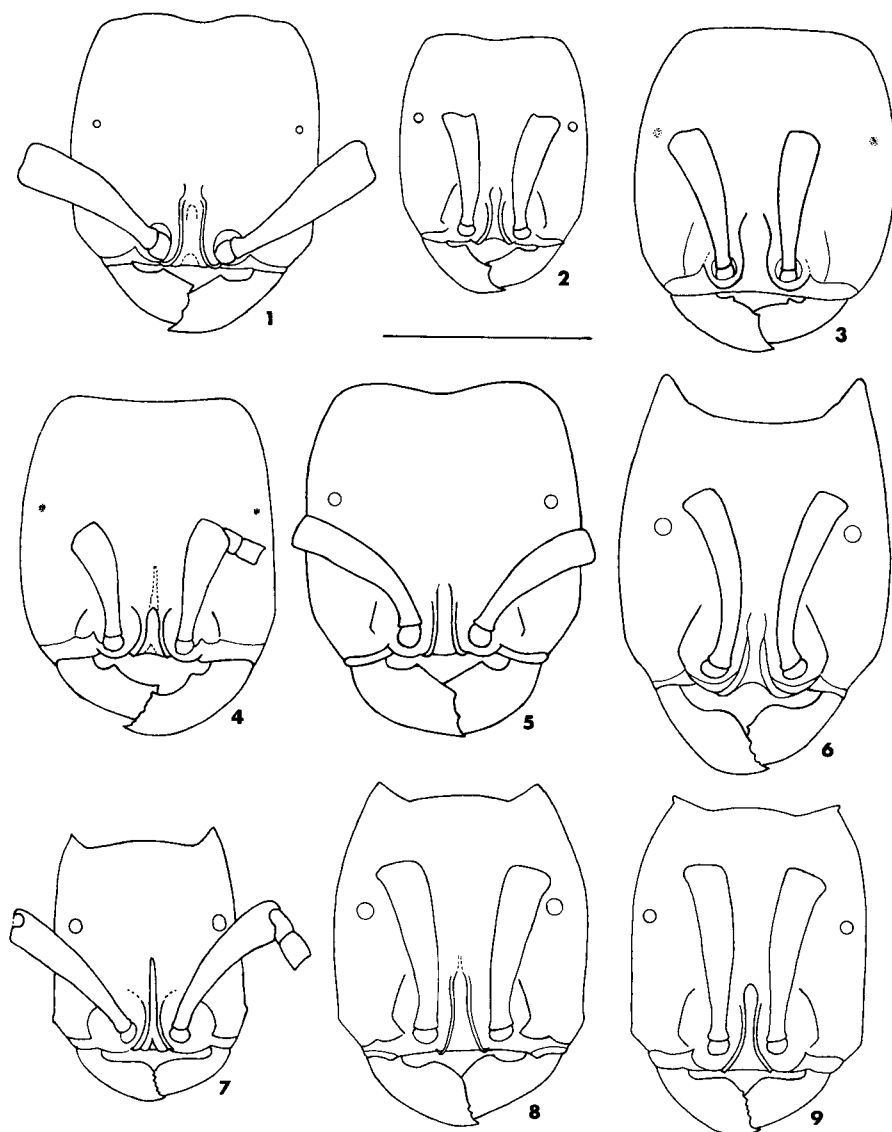


Plate 2. Figs. 1-9. Heads of workers of (1) *Neivamyrmex manni*, (2) *N. opacithorax*, (3) *N. agilis*, (4) *N. fallax*, (5) *N. rugulosus*, (6) *N. sumichrasti*, (7) *N. cornutus*, (8) *N. texanus*, (9) *N. nigrescens*. Line is 1.0 mm.

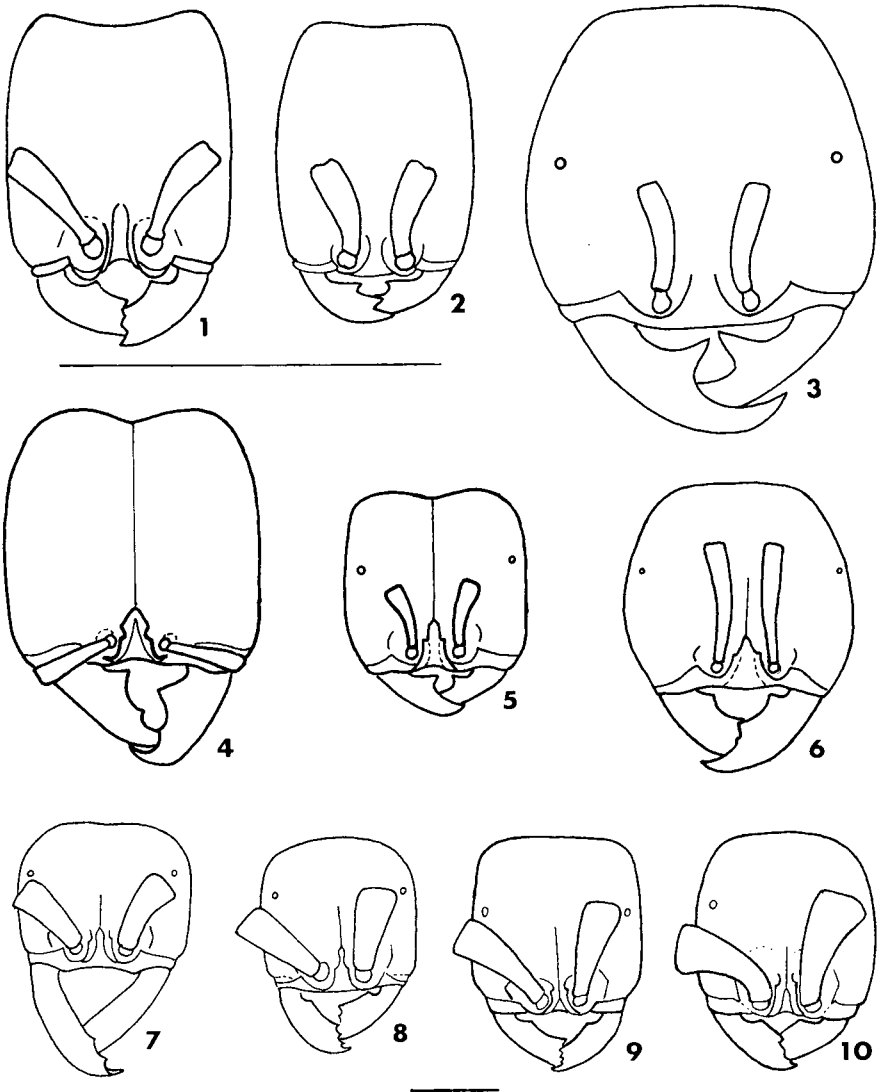


Plate 3. Figs. 1-10. Heads of workers of (1) *Neivamyrmex leonardi*, (2) *N. pauxillus*, (3) *Cheliomyrmex morosus*, (4) *Labidus coecus major*, (5) *L. coecus median*, (6) *L. praedator*, (7) *Nomamyrmex hartigi major*, (8) *Noma. hartigi median*, (9) *Noma. esenbecki wilsoni*, (10) *Noma. esenbecki mordax*. Lines are 1.0 mm.

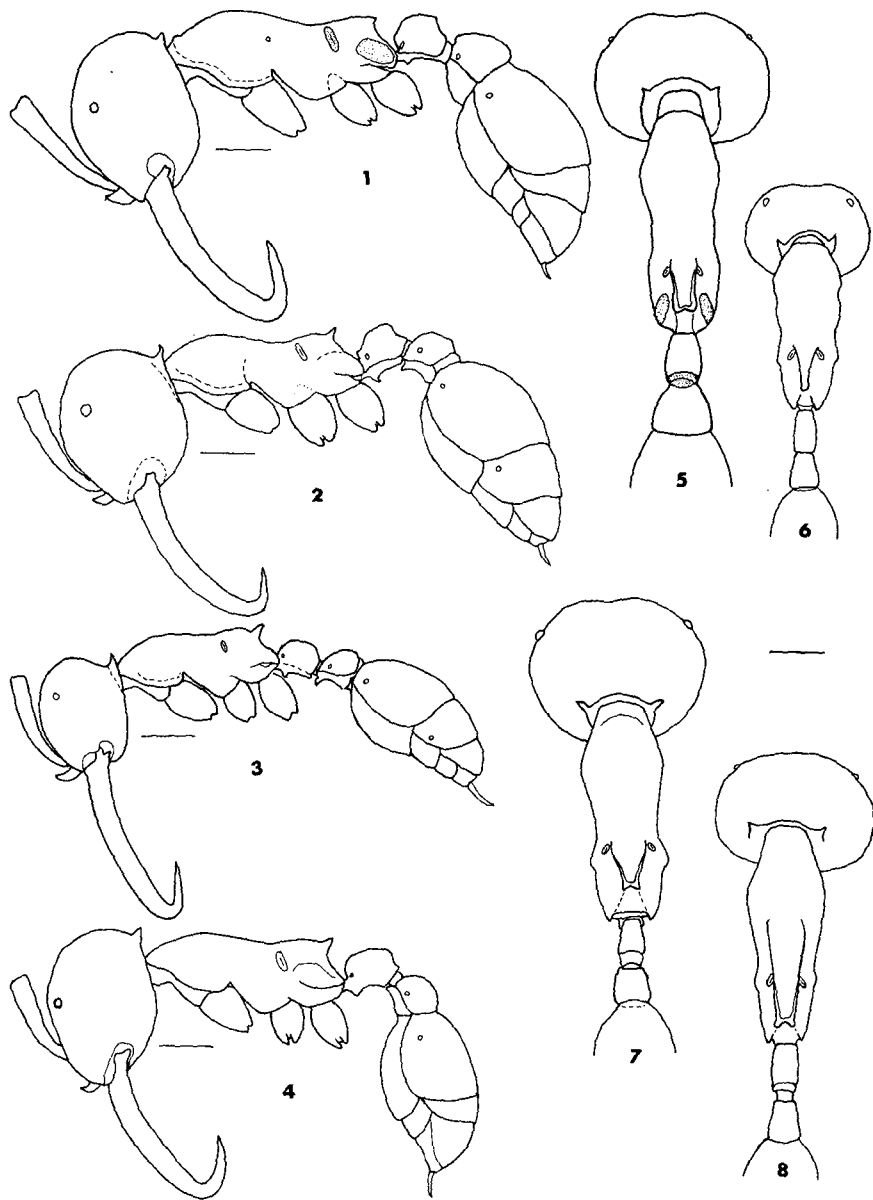


Plate 4. Figs. 1-8. 1-4. Lateral views of soldiers of (1) *Eciton burchelli parvispinum*, (2) *E. vagans angustatum*, (3) *E. mexicanum*, (4) *E. hamatum*. 5-8. Dorsal views of soldiers of (5) *E. burchelli parvispinum*, (6) *E. mexicanum*, (7) *E. vagans angustatum*, (8) *E. hamatum*. Lines are 1.0 mm.

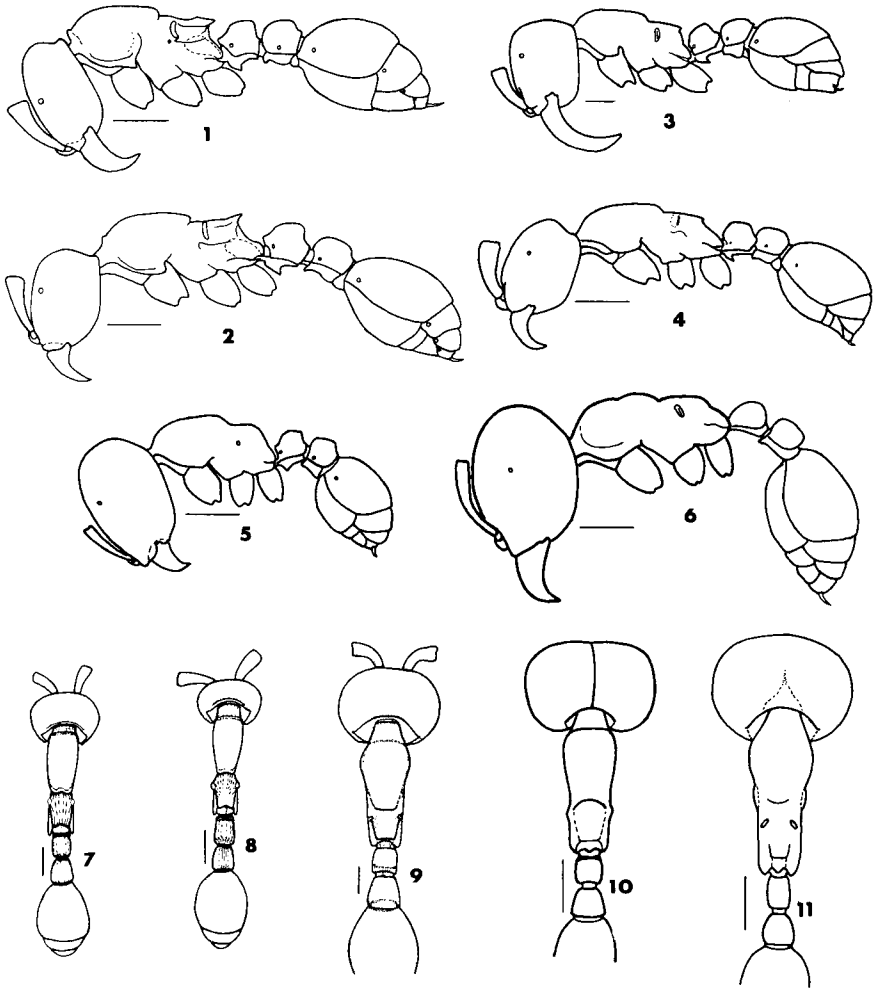


Plate 5. Figs. 1-11. 1-6. Lateral views of workers of (1) *Nomamyrmex esenbecki wilsoni*, (2) *Noma. esenbecki mordax*, (3) *Noma. hartigi major*, (4) *Noma. hartigi median*, (5) *Labidus coecus*, (6) *L. praedator*. 7-11. Dorsal views of workers of (7) *Noma. esenbecki wilsoni*, (8) *Noma. esenbecki mordax*, (9) *Noma. hartigi*, (10) *L. coecus*, (11) *L. praedator*. Lines are 1.0 mm.

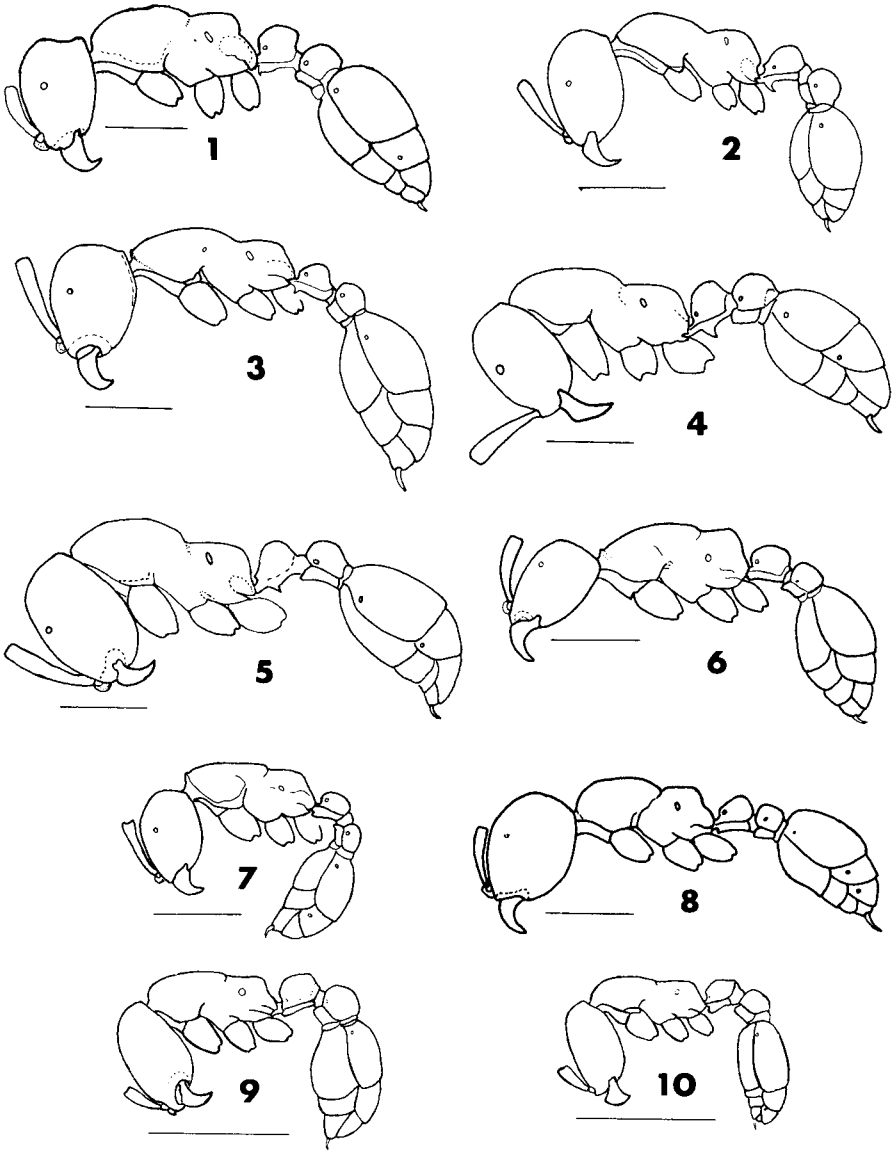


Plate 6. Figs. 1–10. Lateral views of workers of (1) *Neivamyrmex harrisi*, (2) *N. pilosus mexicanus*, (3) *N. melanocephalus*, (4) *N. graciellae*, (5) *N. impudens*, (6) *N. manni*, (7) *N. opacithorax*, (8) *N. agilis*, (9) *N. leonardi*, (10) *N. pauxillus*. Lines are 1.0 mm.

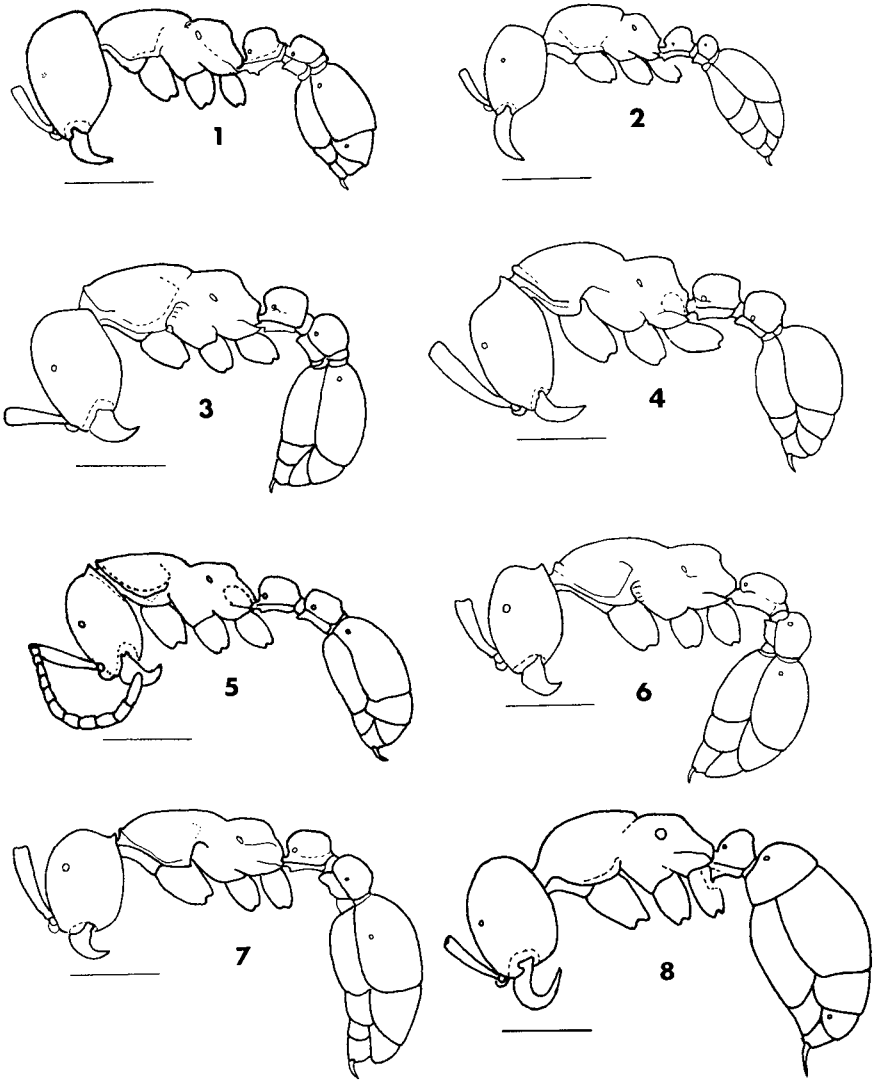


Plate 7. Figs. 1-8. Lateral views of workers of (1) *Neivamyrmex fallax*, (2) *N. spinolai*, (3) *N. rugulosus*, (4) *N. sumichrasti*, (5) *N. cornutus*, (6) *N. texanus*, (7) *N. nigrescens*, (8) *Cheliomyrmex morosus*. Lines are 1.0 mm.

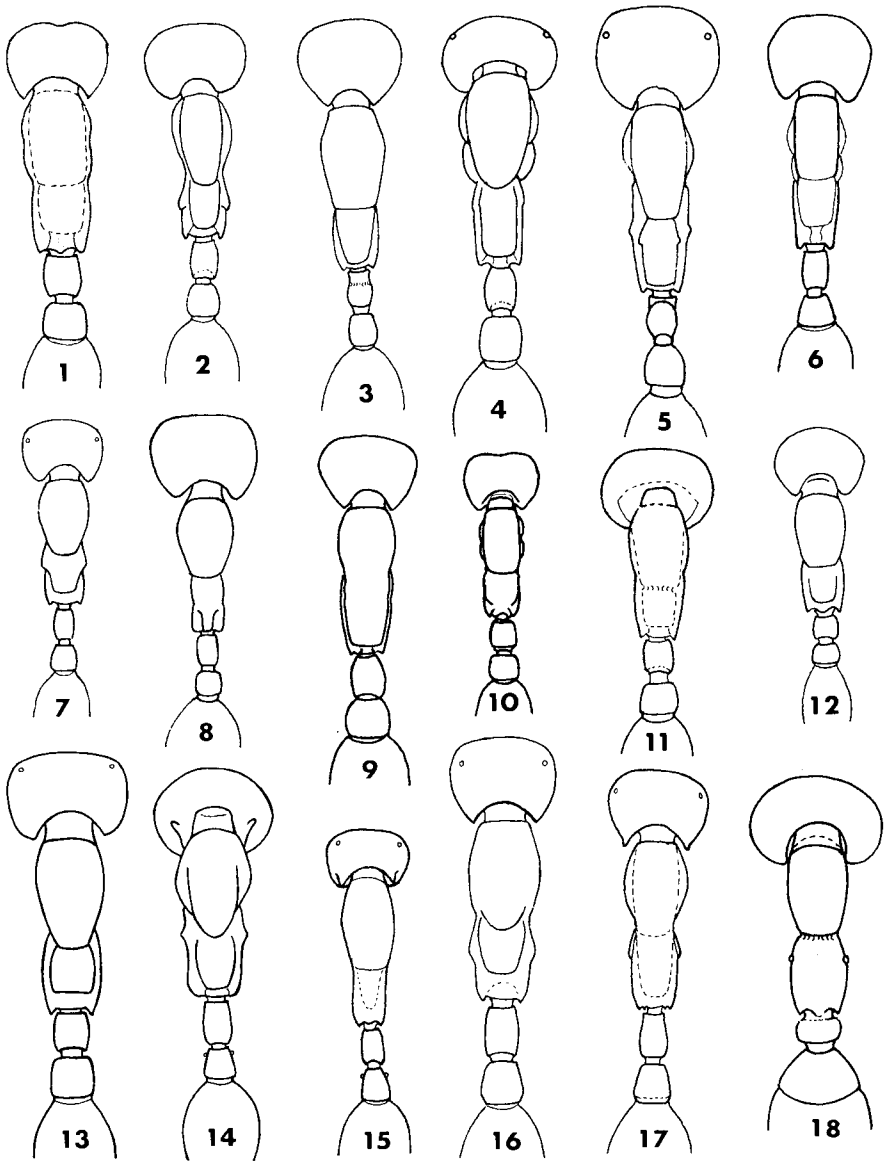


Plate 8. Figs. 1-18. Dorsal views of workers of (1) *Neivamyrmex harrisi*, (2) *N. pilosus mexicanus*, (3) *N. melanocephalus*, (4) *N. graciellae*, (5) *N. impudens*, (6) *N. manni*, (7) *N. opacithorax*, (8) *N. agilis*, (9) *N. leonardi*, (10) *N. pauxillus*, (11) *N. fallax*, (12) *N. spinolai*, (13) *N. rugulosus*, (14) *N. sumichrasti*, (15) *N. cornutus*, (16) *N. texanus*, (17) *N. nigrescens*, (18) *Cheliomyrmex morosus*.

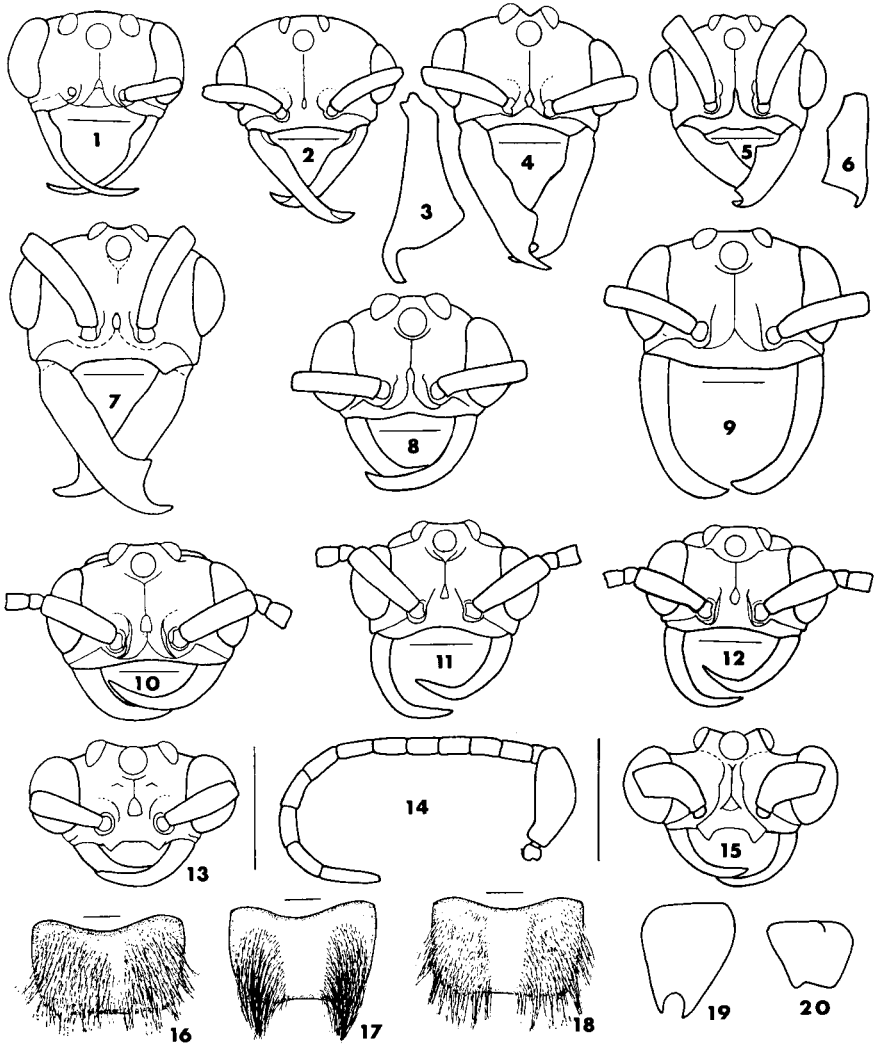


Plate 9. Figs. 1-20. 1, 2, 4, 5, 7-13, 15. Heads of males of (1) *Cheliomyrmex morosus*, (2) *Eciton burchelli parvispinum*, (4) *E. mexicanum*, (5) *E. hamatum*, (7) *E. vagans angustatum*, (8) *Labidus coecus*, (9) *L. praedator*, (10) *Nomamyrmex hartigi*, (11) *Noma. esenbecki wilsoni*, (12) *Noma. esenbecki mordax*, (13) *Neivamyrmex klugi distans*, (15) *N. guerini*. 3, 6. Mandibles of males of (3) *E. mexicanum*, (6) *E. hamatum*. 14. Antenna of male of *N. guerini*. 16-18. Dorsal views of fifth tergites of males of (16) *Noma. hartigi*, (17) *Noma. esenbecki wilsoni*, (18) *Noma. esenbecki mordax*. 19, 20. Procoxae of males of (19) *N. swainsoni*, (20) *N. andrei*. Lines are 1.0 mm.

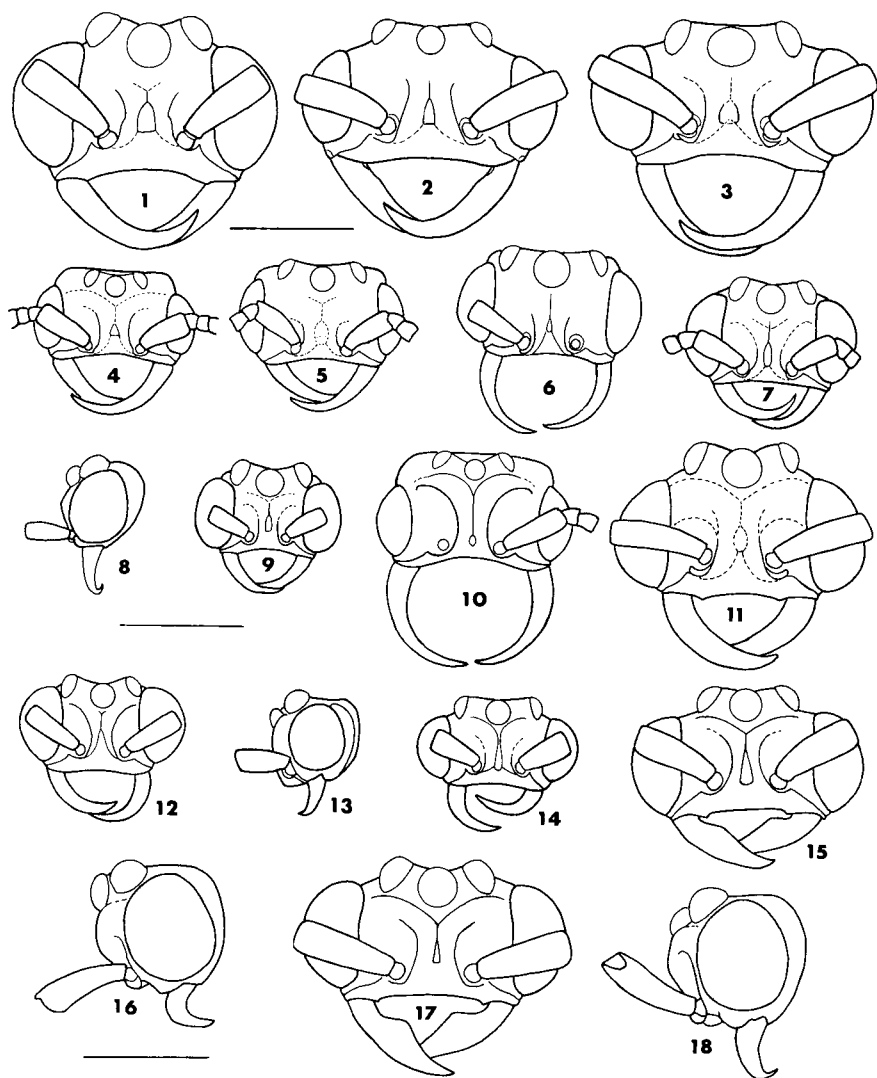


Plate 10. Figs. 1–18. Heads of males of (1) *Neivamyrmex halidayi*, (2) *N. spinolai*, (3) *N. swainsoni*, (4) *N. spoliator*, (5) *N. fuscipennis*, (6) *N. macropterus*, (7) *N. tristis*, (8, 9) *N. melsheimeri*, (10) *N. cloosae*, (11) *N. andrei*, (12) *N. fumosus*, (13, 14) *N. minor*, (15, 16) *N. inflatus* from Yucatan, (17, 18) *N. inflatus* from Nayarit. Lines are 1.0 mm.

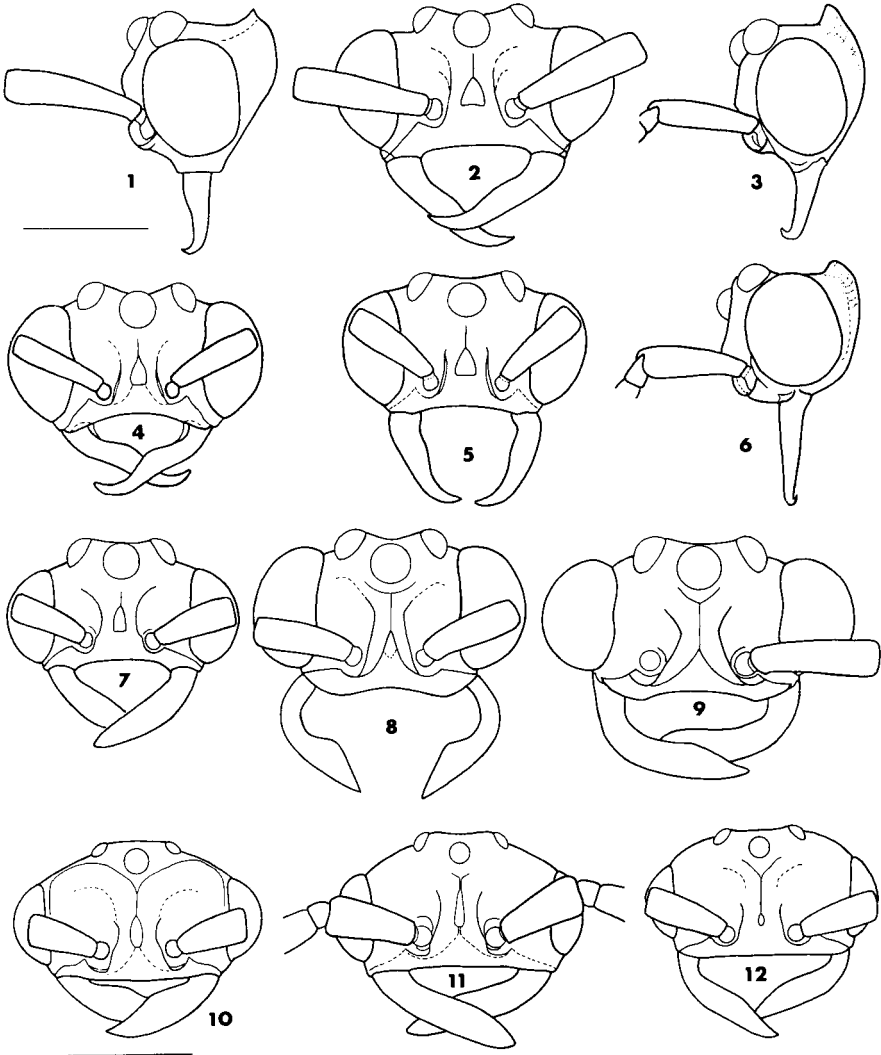


Plate 11. Figs. 1-12. Heads of males of (1, 2) *Neivamyrmex longiscapus*, (3, 4) *N. pilosus mexicanus*, (5, 6) *N. pilosus mandibularis*, (7) *N. harrisi*, (8) *N. diabolus*, (9) *N. angulimandibulatus*, (10) *N. nigrescens*, (11) *N. texanus*, (12) *N. opacithorax*. Lines are 1.0 mm.

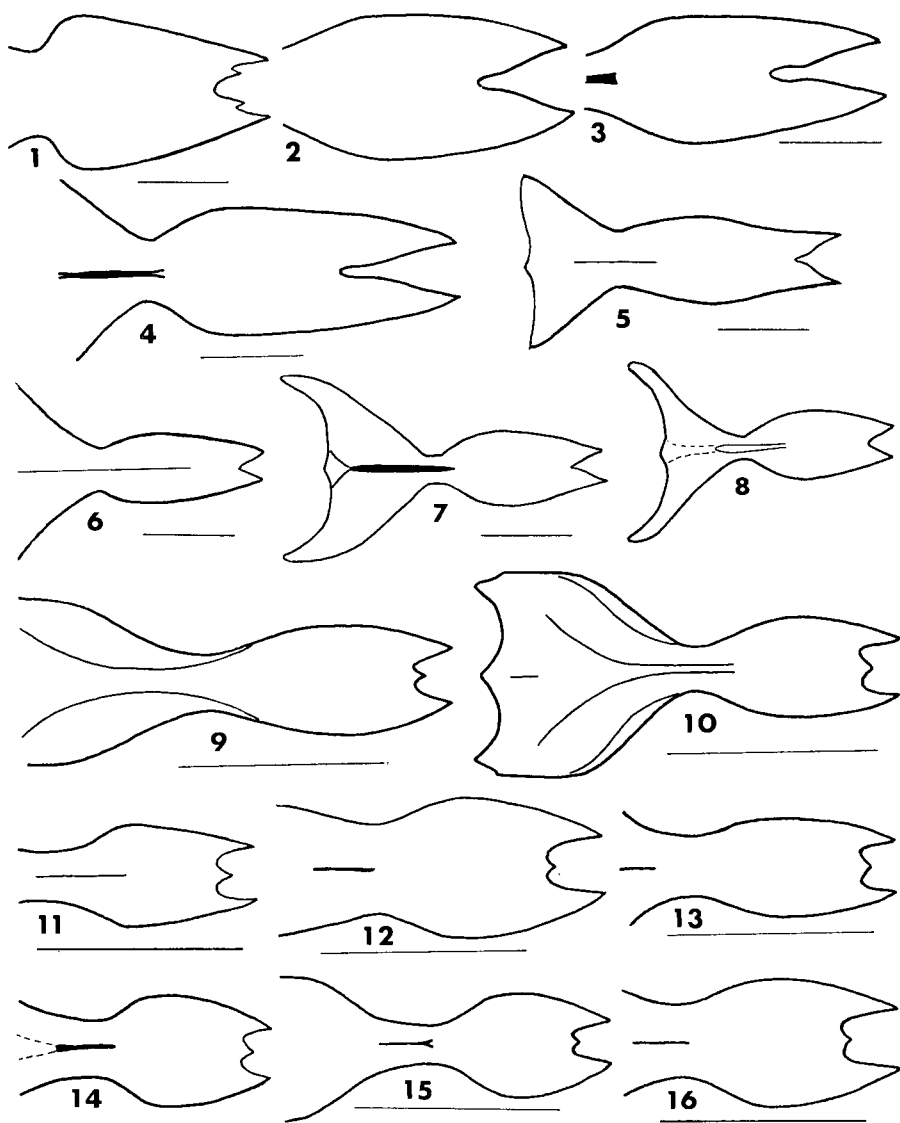


Plate 12. Figs. 1–16. Subgenital plates of males of (1) *Cheliomyrmex morosus*, (2) *Noma-myrmex esenbecki mordax*, (3) *Noma. esenbecki wilsoni*, (4) *Noma. hartigi*, (5) *Eciton hamatum*, (6) *E. burchelli parvispinum*, (7) *E. mexicanum*, (8) *E. vagans angustatum*, (9) *Neivamyrmex guerini*, (10) *N. fumosus*, (11) *N. spoliator*, (12) *N. fuscipennis*, (13) *N. minor*, (14) *N. tristis*, (15) *N. melsheimeri*, (16) *N. macropterus*. Lines are 1.0 mm.

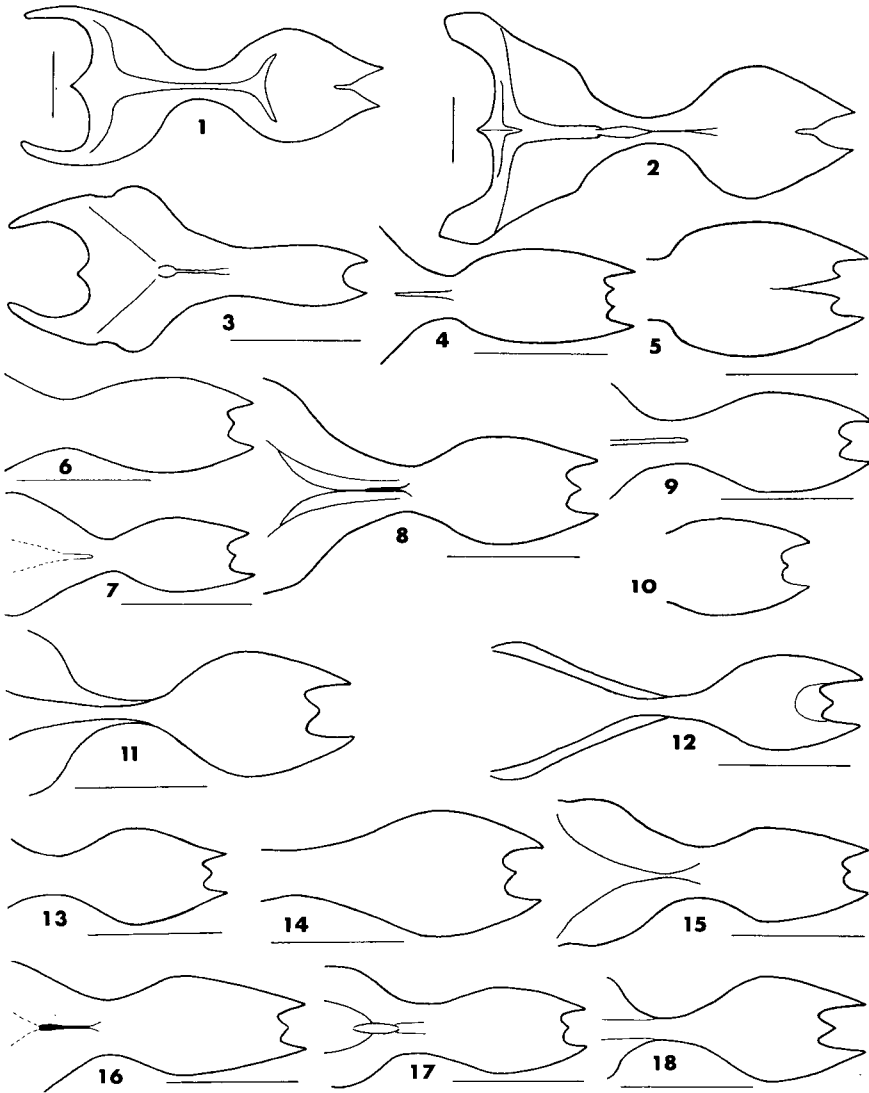


Plate 13. Figs. 1-18. Subgenital plates of males of (1) *Labidus coecus*, (2) *L. praedator*, (3) *Neivamyrmex klugi distans*, (4) *N. halidayi*, (5) *N. spinolai*, (6) *N. andrei*, (7) *N. harrisi*, (8) *N. swainsoni*, (9) *N. inflatus* from Yucatan, (10) *N. inflatus* from Nayarit, (11) *N. longiscapus*, (12) *N. pilosus mexicanus*, (13) *N. diabolus*, (14) *N. angulimandibulatus*, (15) *N. nigrescens*, (16) *N. texanus*, (17) *N. opacithorax*, (18) *N. pilosus mandibularis*. Lines are 1.0 mm.

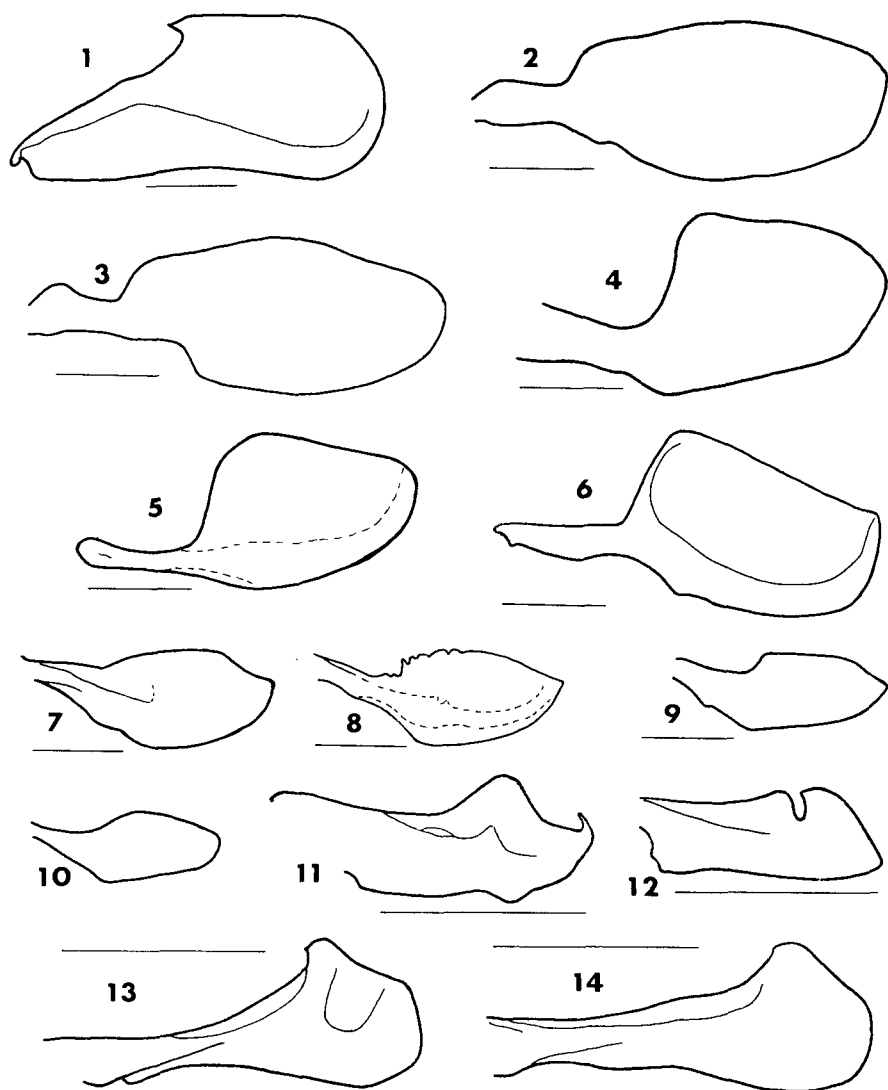


Plate 14. Figs. 1-14. Stipites of males of (1) *Cheliomyrmex morosus*, (2) *Nomamyrmex esenbecki wilsoni*, (3) *Noma. esenbecki mordax*, (4) *Noma. hartigi*, (5) *Labidus coecus*, (6) *L. praedator*, (7) *Eciton burchelli parvispinum*, (8) *E. mexicanum*, (9) *E. hamatum*, (10) *E. vagans angustatum*, (11) *Neivamyrmex klugi distans*, (12) *N. guerini*, (13) *N. halidayi*, (14) *N. spinolai*. Lines are 1.0 mm.

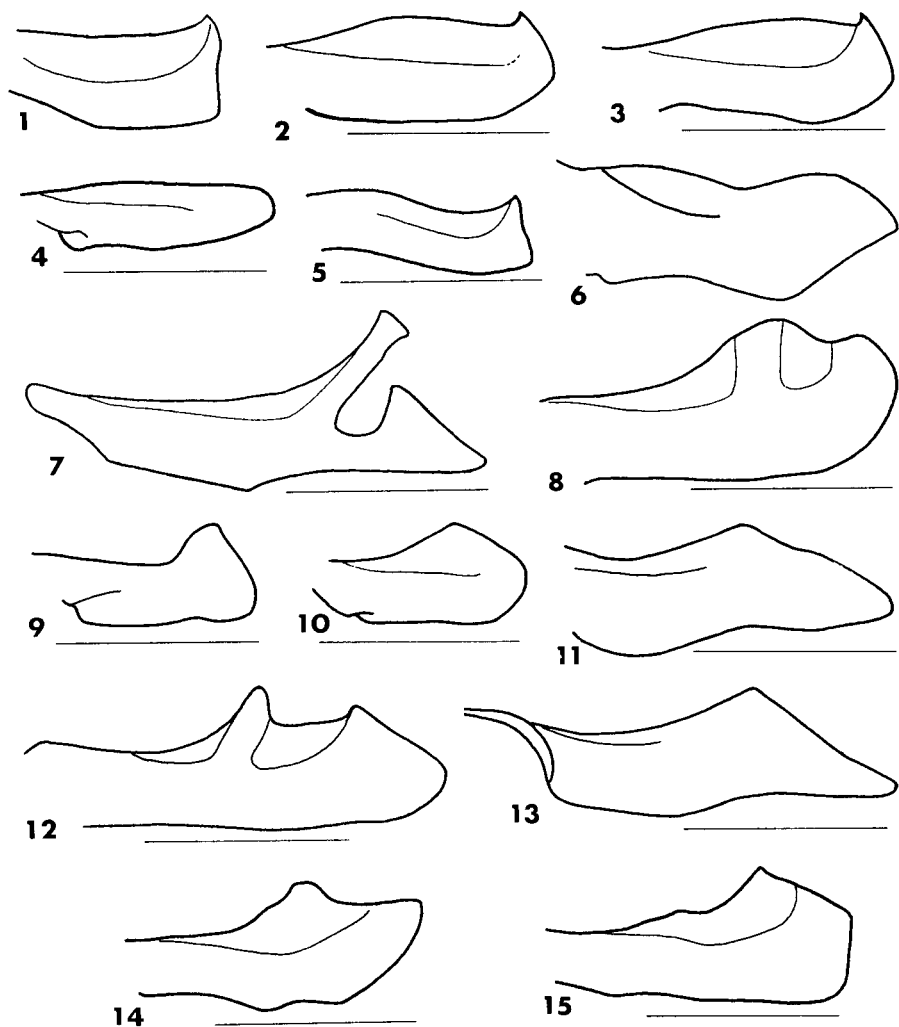


Plate 15. Figs. 1-15. Stipites of males of (1) *Neivamyrmex spoliator*, (2) *N. fuscipennis*, (3) *N. macropterus*, (4) *N. tristis*, (5) *N. melsheimeri*, (6) *N. cloosae*, (7) *N. andrei*, (8) *N. swainsoni*, (9) *N. fumosus*, (10) *N. minor*, (11) *N. inflatus* from Yucatan, (12) *N. longiscapus*, (13) *N. inflatus* from Nayarit, (14) *N. pilosus mexicanus*, (15) *N. pilosus mandibularis*. Lines are 1.0 mm.

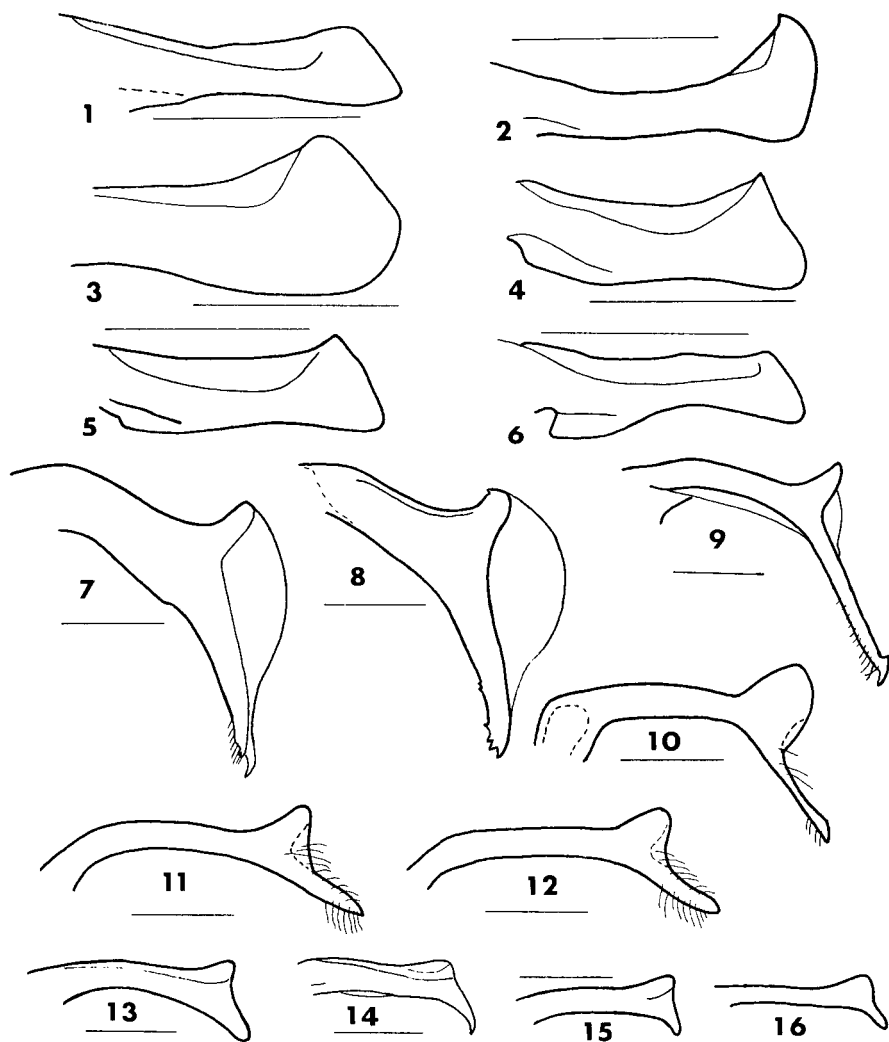


Plate 16. Figs. 1-16. 1-6. Stipites of males of (1) *Neivamyrmex harrisi*, (2) *N. texanus*, (3) *N. angulimandibulatus*, (4) *N. diabolus*, (5) *N. nigrescens*, (6) *N. opacithorax*. 7-16: Sagittae of males of (7) *Labidus praedator*, (8) *L. coecus*, (9) *Cheliomyrmex morosus*, (10) *Nomamyrmex hartigi*, (11) *Noma. esenbecki wilsoni*, (12) *Noma. esenbecki mordax*, (13) *Eciton burchelli parvispinum*, (14) *E. mexicanum*, (15) *E. hamatum*, (16) *E. vagans angustatum*. Lines are 1.0 mm.

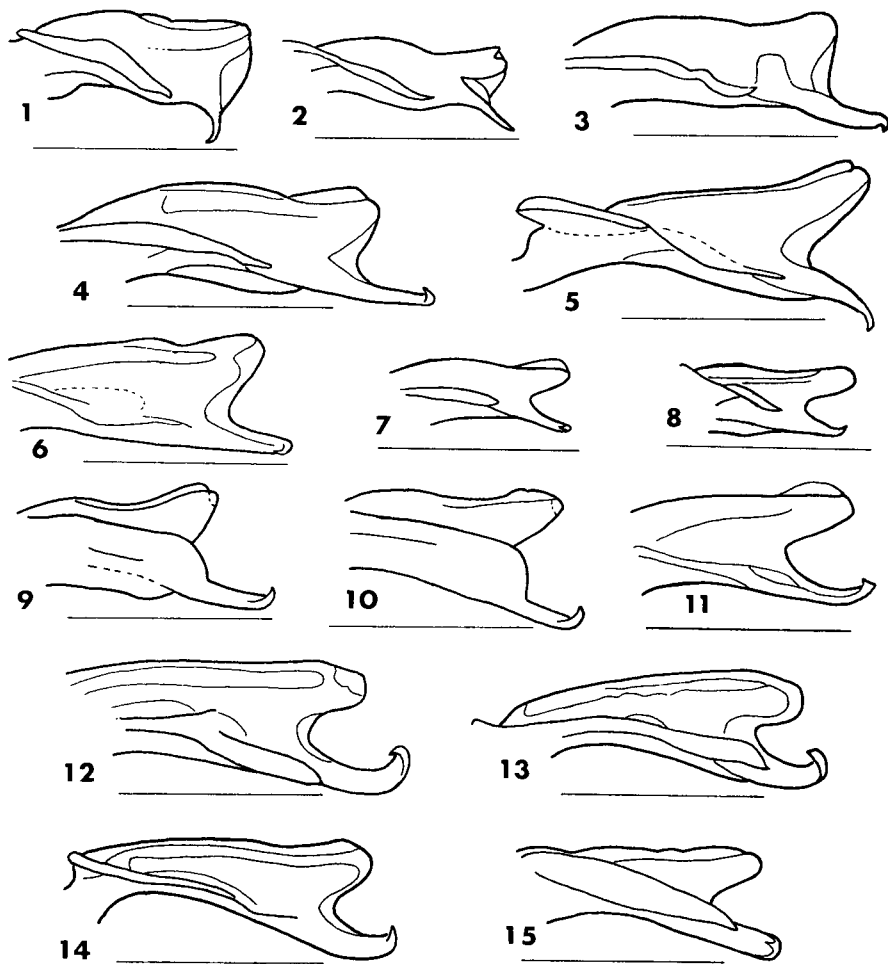


Plate 17. Figs. 1-15. Sagittae of males of (1) *Neivamyrmex klugi distans*, (2) *N. guerini*, (3) *N. halidayi*, (4) *N. spinolai*, (5) *N. swainsoni*, (6) *N. andrei*, (7) *N. fumosus*, (8) *N. minor*, (9) *N. inflatus* from Yucatan, (10) *N. inflatus* from Nayarit, (11) *N. diabolus*, (12) *N. longiscapus*, (13) *N. pilosus mexicanus*, (14) *N. pilosus mandibularis*, (15) *N. harrisi*. Lines are 1.0 mm.

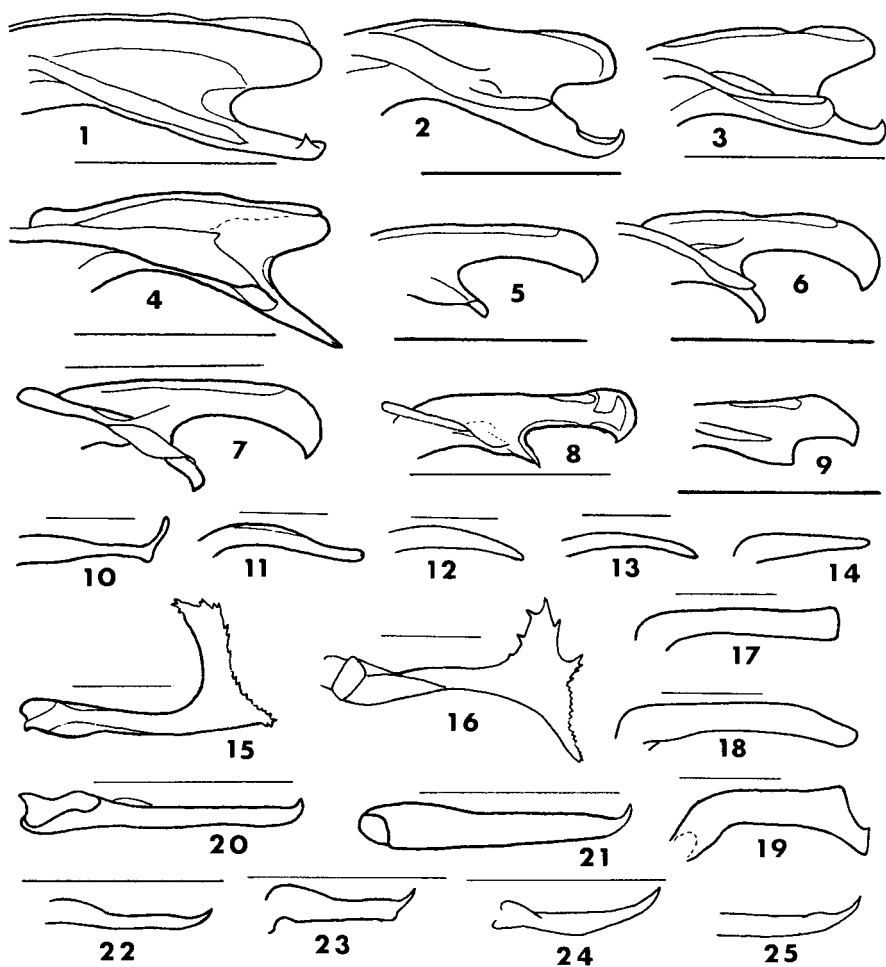


Plate 18. Figs. 1-25. 1-9. Sagittae of males of (1) *Neivamyrmex angulimandibulatus*, (2) *N. nigrescens*, (3) *N. opacithorax*, (4) *N. texanus*, (5) *N. spoliator*, (6) *N. macropterus*, (7) *N. fuscipennis*, (8) *N. tristis*, (9) *N. melsheimeri*. 10-25. Volsellae of males of (10) *Cheliomyrmex morosus*, (11) *Eciton burchelli parvispinum*, (12) *E. mexicanum*, (13) *E. hamatum*, (14) *E. vagans angustatum*, (15) *Labidus coecus*, (16) *L. praedator*, (17) *Nomamyrmex esenbecki wilsoni*, (18) *Noma. esenbecki mordax*, (19) *Noma. hartigi*, (20) *N. halidayi*, (21) *N. spinolai*, (22) *N. guerinii*, (23) *N. klugii distans*, (24) *N. tristis*, (25) *N. melsheimeri*. Lines are 1.0 mm.

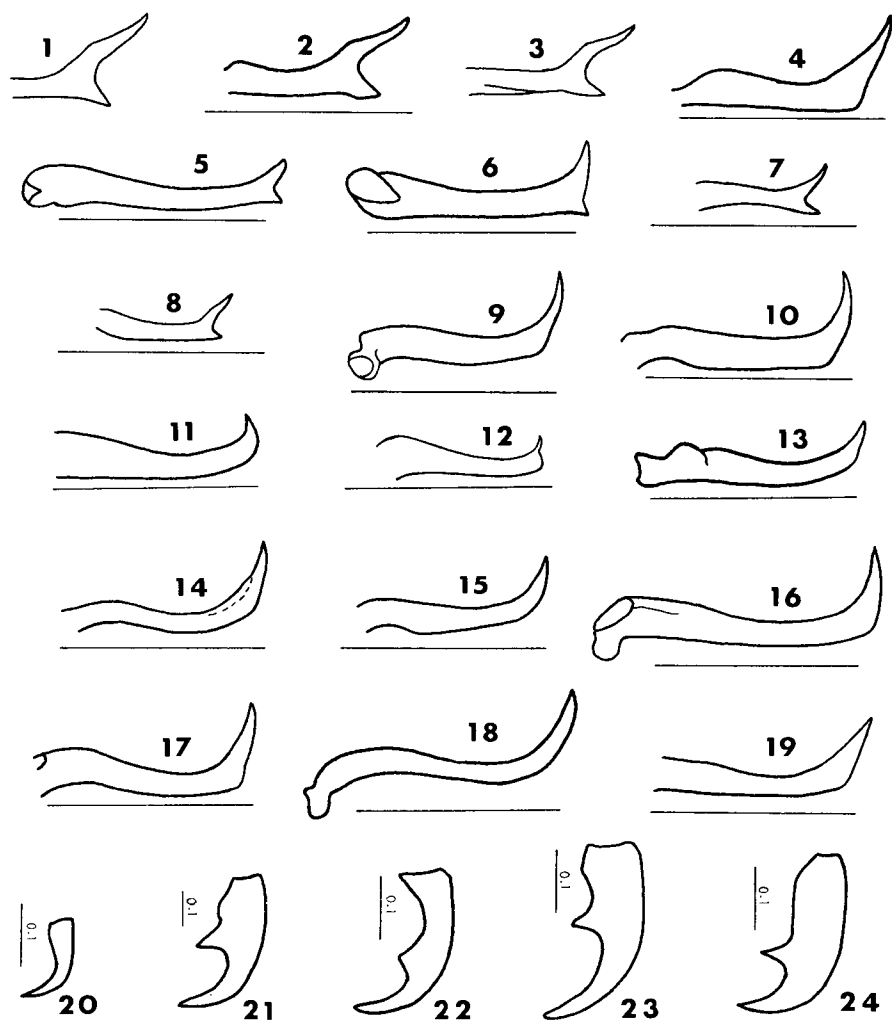


Plate 19. Figs. 1-24. 1-19 (lines are 1.0 mm). Volsellae of males of (1) *Neivamyrmex spoliator*, (2) *N. fuscipennis*, (3) *N. macropterus*, (4) *N. cloosae*, (5) *N. andrei*, (6) *N. swainsoni*, (7) *N. fumosus*, (8) *N. minor*, (9) *N. inflatus* from Yucatan, (10) *N. inflatus* from Nayarit, (11) *N. longiscapus*, (12) *N. pilosus mexicanus*, (13) *N. pilosus mandibularis*, (14) *N. harrisi*, (15) *N. diabolus*, (16) *N. angulimandibulatus*, (17) *N. nigrescens*, (18) *N. texanus*, (19) *N. opacithorax*. 20-24 (lines are 0.1 mm). Claws of workers of (20) *N. pilosus*, (21) *Eciton burchelli*, (22) *Labidus praedator*, (23) *Nomamyrmex esenbecki mordax*, (24) *Cheliomyrmex morosus*.

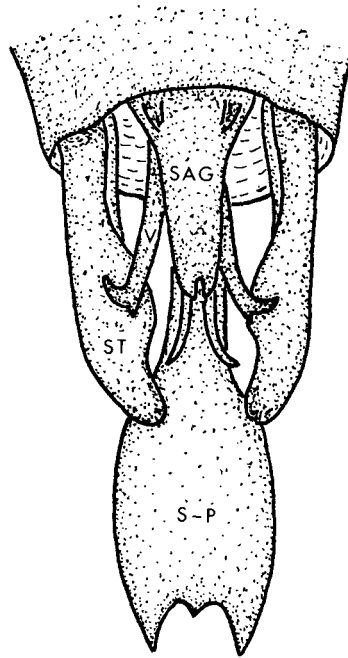


Plate 20. Genitalia of male of *Neivamyrmex swainsoni* with apical gastric segments removed. SAG = sagitta, V = volsella, ST = stipes, S-P = subgenital plate.

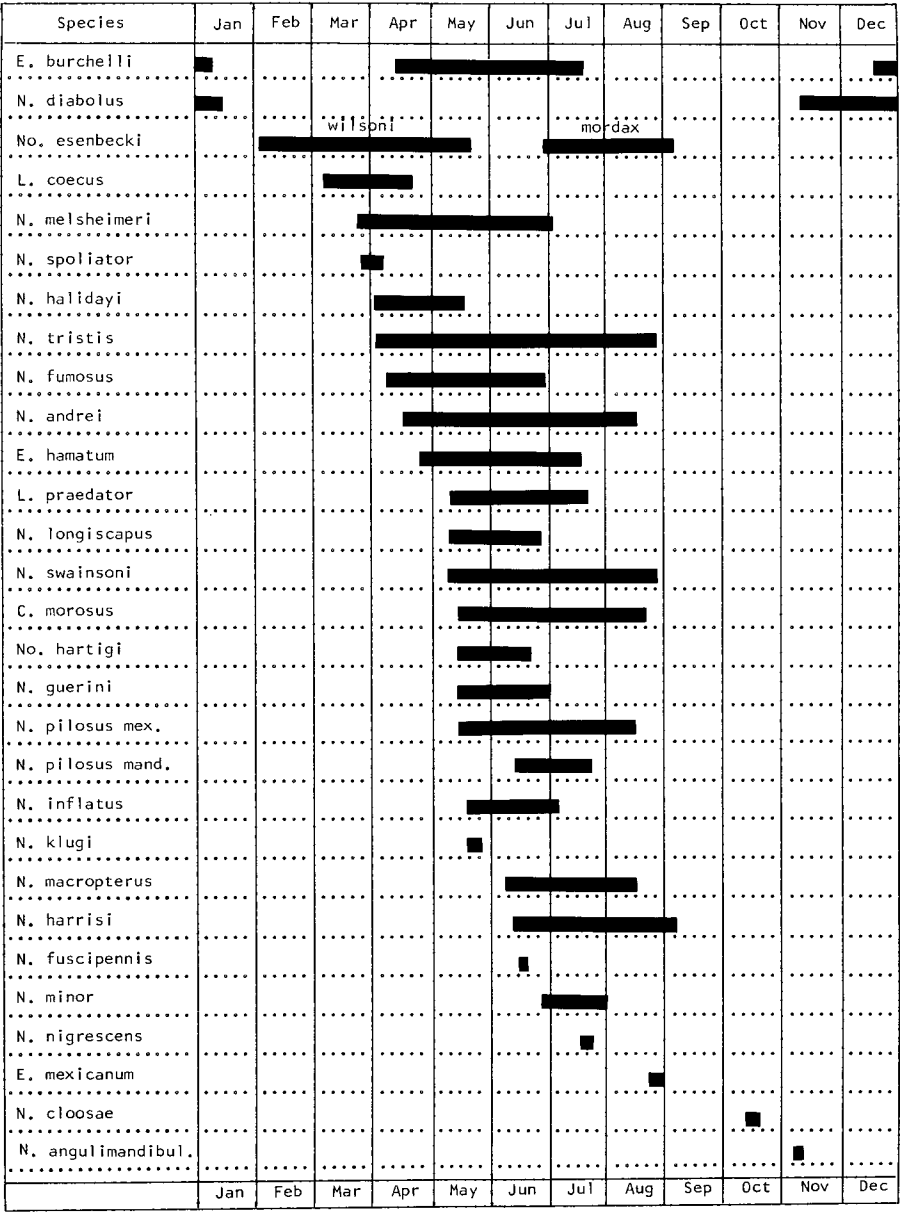
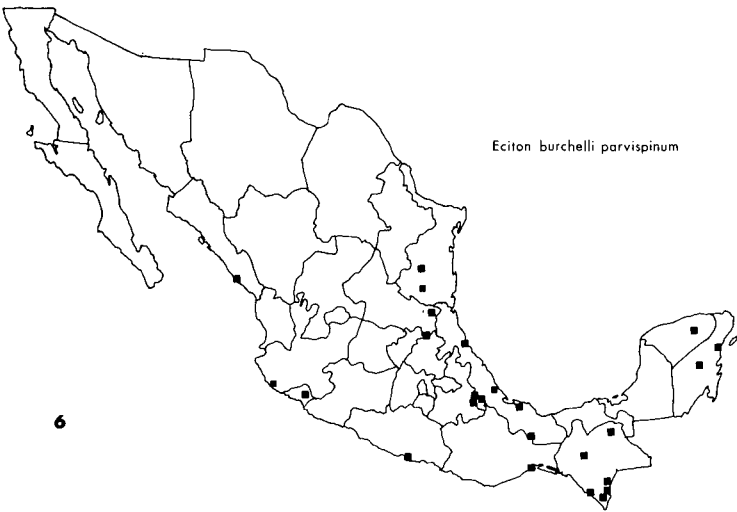
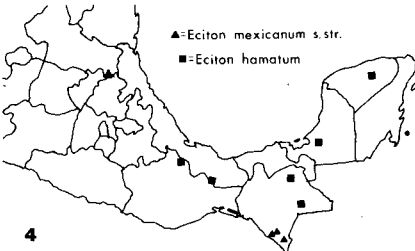
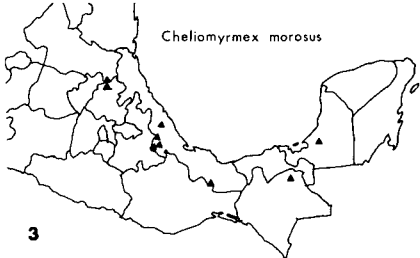
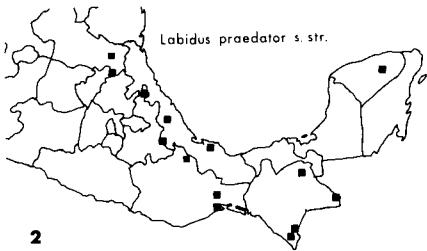


Plate 21. Flight periods of male army ants in Mexico (based on collection records). No data on male flights in Mexico was found for *E. vagans angustatum*, *N. spinolai*, *N. opacithorax*, and *N. texanus*; however, males of these species have been collected from other countries as follows: *E. vagans angustatum* (Costa Rica, Nov.), *N. spinolai* (Argentina & Brazil, Sept.-Dec.), *N. opacithorax* (U.S.A., Sept.-Dec.), *N. texanus* (U.S.A., Sept.-Nov.).

Index to Distribution Maps
(map numbers in parentheses)

- | | |
|-------------------------------------|---|
| <i>Cheliomyrmex</i> | <i>N. inflatus</i> (17) |
| <i>C. morosus</i> (3) | <i>N. klugi distans</i> (17) |
| <i>Eciton</i> | <i>N. leonardi</i> (11) |
| <i>E. burchelli parvispinum</i> (6) | <i>N. longiscapus</i> (19) |
| <i>E. hamatum</i> (4) | <i>N. macropterus</i> (15) |
| <i>E. mexicanum s. str.</i> (4) | <i>N. manni</i> (10) |
| <i>E. vagans angustatum</i> (5) | <i>N. melanocephalus</i> (9) |
| <i>Labidus</i> | <i>N. melsheimeri</i> (15) |
| <i>L. coecus</i> (1) | <i>N. minor</i> (15) |
| <i>L. praedator s. str.</i> (2) | <i>N. nigrescens</i> (13) |
| <i>Neivamyrmex</i> | <i>N. opacithorax</i> (10) |
| <i>N. agilis</i> (10) | <i>N. pauxillus</i> (11) |
| <i>N. andrei</i> (16) | <i>N. pilosus mandibularis</i> (8) |
| <i>N. angulimandibulatus</i> (20) | <i>N. pilosus mexicanus</i> (8) |
| <i>N. cloosae</i> (16) | <i>N. rugulosus</i> (12) |
| <i>N. cornutus</i> (13) | <i>N. spinolai</i> (one record: "Veracruz") |
| <i>N. diabolus</i> (19) | <i>N. spoliator</i> (17) |
| <i>N. fallax</i> (11) | <i>N. sumichrasti</i> (12) |
| <i>N. fumosus</i> (20) | <i>N. swainsoni</i> (14) |
| <i>N. fuscipennis</i> (7) | <i>N. texanus</i> (13) |
| <i>N. graciellae</i> (9) | <i>N. tristis</i> (16) |
| <i>N. guerini</i> (18) | <i>Nomamyrmex</i> |
| <i>N. halidayi</i> (7) | <i>N. esenbecki mordax</i> (21) |
| <i>N. harrisi</i> (7) | <i>N. esenbecki wilsoni</i> (21) |
| <i>N. impudens</i> (9) | <i>N. hartigi</i> (21) |

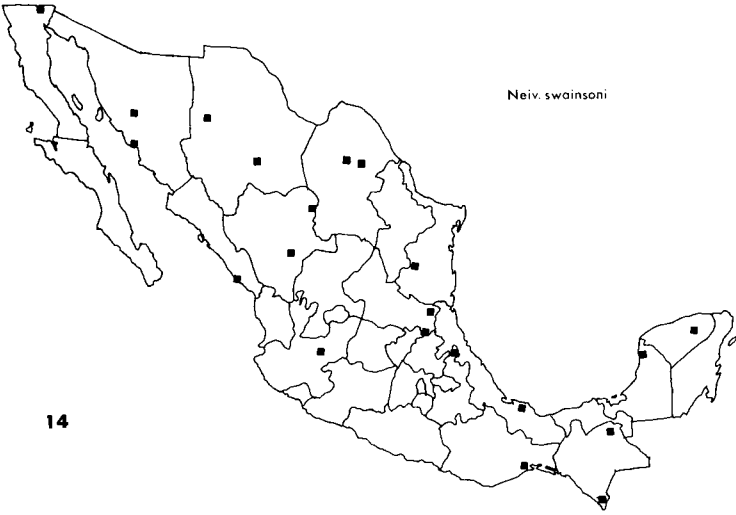




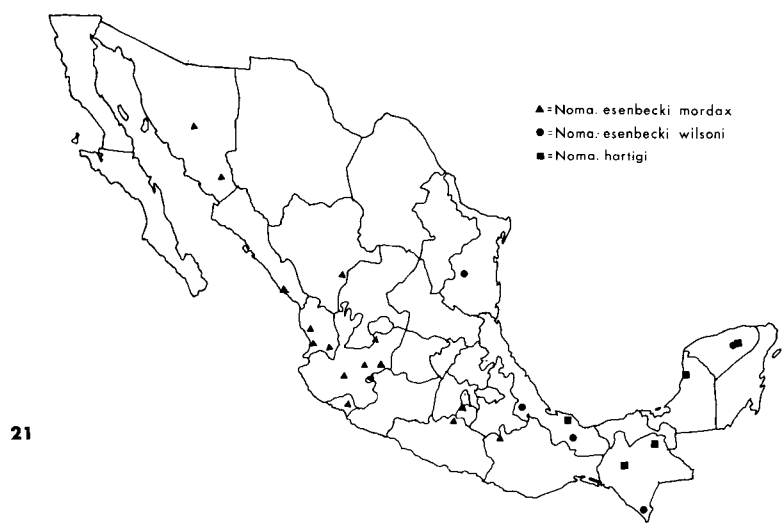
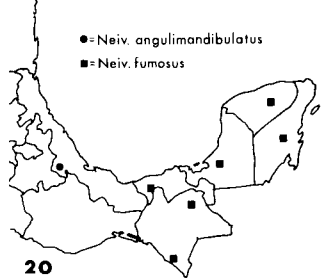
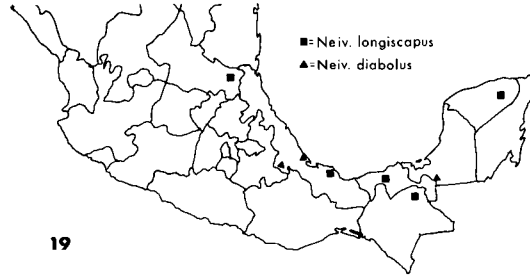
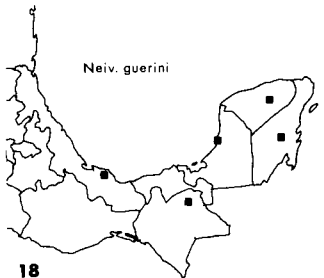
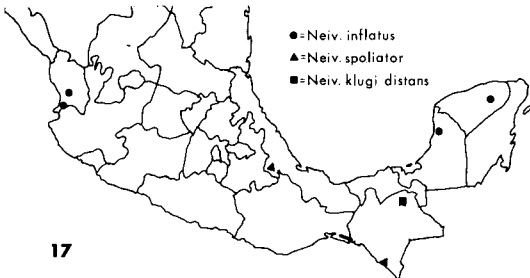












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